METAL INDUSTRY

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ALUMINUM WORLD — COPPER AND BRASS

BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

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A Vital Letter to Everybody Whose Product Involves Electro-Plating!

Unless You Take Immediate Action, A Most Important Work Must Stop

THERE are not and never have been any recognized standards in electroplating. Nobody really knows exact amount of plate required to protect and beautify a plated article. For six years the American Electroplaters' Society, with the help of a few progressive suppliers and manufacturers, has maintained an experienced research engineer working at the United States Bureau of Standards under the direction of Dr. William Blum, and in conjunction with the American Society for Testing Materials to develop sufficient test data to set up long-needed plating standards. To date research has been devoted to determining the Corrosion Resistance Value of Plated Coatings.

Seven thousand plated specimens are on test at different locations in the United States. Countless laboratory experiments are going on in Washington. One more year will be required to complete the present important research project.

$4,000 a year is required to carry on this important work, but due to the present economic conditions, our research funds are exhausted.

If you feel that research work of this nature is of value to industry, that it will improve your product and lower your cost, then we appeal to you for financial assistance for completing this work. As there are more than two thousands companies who will benefit from this research work, large subscriptions are not necessary, providing all contribute. We, therefore, ask that you assist in financing this important work by subscribing an amount not more than $25. Full and public acknowledgment of your assistance will be made.

Send your subscription to Mr. Walter Fraine, Treasurer Research Fund, 507 Grand Ave., Dayton, Ohio, or to any of the following members of the Research Committee:

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Sincerely

C. L. VAN DERAU

President, American Electroplaters' Society

Cathode Sputtering–A Commercial Application

By HAL F. FRUTH

Western Electric Company, Inc., New York

The Theory of Cathode Sputtering With the Advantages and Limitations in the Application of this Process Are Discussed, Followed by a Description of the Commercial Equipment and Methods for Applying Gold Electrode Surfaces to Diaphragms of Certain Types of Microphones

FROM PHYSICS, APRIL, 1932

ALTHOUGH the process of electrostatic deposition of metals by high voltages in a partial vacuum, commonly known as cathode sputtering, has been known for more than a half century, it has heretofore found but little commercial application. Rather extensive use of it has, however, been made in physics research laboratories for such purposes as the production of highly reflecting surfaces on mirrors and prisms, for spectrometers, interferometers, etc., and the making of extremely thin metal films for fundamental studies in atomic structure and electron theory. Sputtering has also been used in the manufacture of very fine conducting quartz fibres for suspensions in sensitive instruments such as quadrant and string electrometers, galvanometers, and electrocardiographs, and, to some extent, for etching certain metals.

In the following paragraphs it is intended to give a brief explanation of the process and a description of a commercial application in the production of diaphragms for certain microphones.

Theory

Some fifty years ago, various investigators working on high voltage discharges in vacuo discovered that disintegration of the cathode occurs for nearly all metals and that the removed metal is deposited in a very fine state of subdivision on nearby objects. Various theories have been formulated as to the mechanism of this phenomenon. Some investigators have attempted to explain it by stating that it is a type of electrical evaporation where the electrical potential is analogous to the temperature potential in ordinary thermal evaporation. More plausible theories, recently advanced, are that the metal atoms or particles leave the cathode as a result of positive ion bombardment, either as a result of single impacts or by cumulative action. This does not seem to hold for all metals and residual gases, and it has been suggested that in some cases sputtering is due to the absorption of radiation produced when the gas ions are stopped at the cathode.

There has also been a great deal of controversy as to the structure of the sputtered film. Most of the more recent evidence indicates that the films are of a crystalline nature.

Advantages of Sputtering Over Other Methods of Metallizing

In general, cathode sputtering cannot compete with the more common processes of metallic deposition, but in many special cases it can be employed where other methods are inapplicable. This is especially true (*a*) when metals are to be deposited upon non-conductors, (*b*) when the surfaces to be metallized would be injured by contact with chemical solutions or high temperature, (*c*) when either a very thin continuous metal coat or a very smooth, highly reflecting coat is desired, (*d*) when metals are to be deposited that are very difficult to deposit in any other manner, such as silicon, tellurium, or selenium, (*e*) when a metal is to be deposited upon another metal far removed from it in the electrochemical series, such as gold or platinum upon aluminum or magnesium. In such cases, electrolytic corrosion is very apt to occur in the presence of moisture or traces of electrolyte.

Commercial Application

Cathode sputtering has been used commercially by the Western Electric Company with excellent results in the manufacture of diaphragms for carbon broadcasting transmitters, illustrated in Fig. 1. This type of microphone consists essentially of a tightly stretched duralumin diaphragm located between two chambers containing granular carbon. The manner in which the double button type of microphone is connected to the amplifiers of the broadcasting, public address, or sound picture system is schematically shown in Fig. 2. Those parts of the diaphragm which come in contact with the carbon are covered with gold, a metal which has been found to be ideally suited for microphonic purposes. It is exceedingly important that the gold coating be continuous and remain adherent, for if the carbon should make contact in a number of places with the duralumin, it is quite likely that the microphone would be noisy and therefore unfit for use.

When the gold spots were formed by the plating process previously used, considerable trouble was experienced because of such defects as blisters, peeling, and pin holes probably due largely to electrolytic corrosion. The substitution of the sputtering process has practically eliminated such defects. Some additional advantage over electrolytic plating is that a thinner continuous film can be

deposited, making it possible to stretch the diaphragm to a higher natural frequency with less tension. This decrease in tension has resulted in a smaller frequency loss due to fatigue. The introduction of the sputtering process has, therefore, not only improved the quality of the microphone, but lengthened its life.

order to overcome variations in pressure due to the early evolution of gases and the later cleanup usually accompanying electrical discharges in vacuo. The value is of rugged construction as shown in Fig. 5 and consists of a standard No. 0 taper pin about 2½ inches long, very closely lapped into a bronze bushing. A pressure of

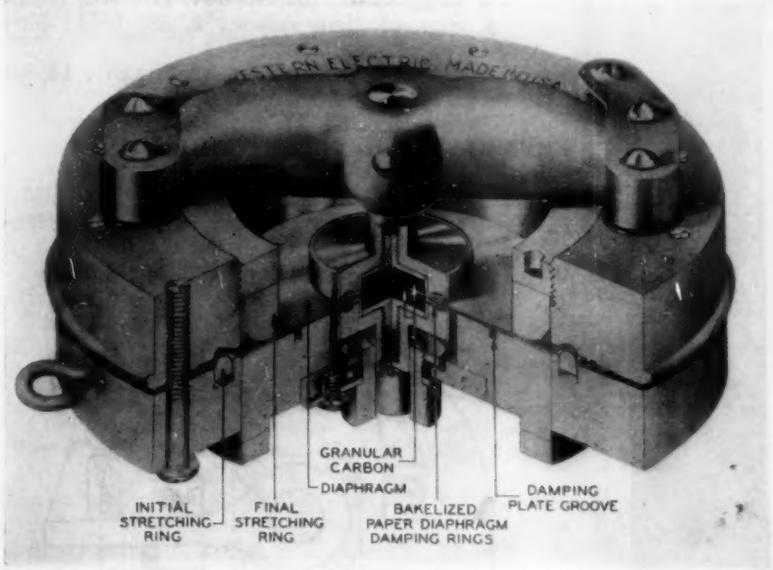
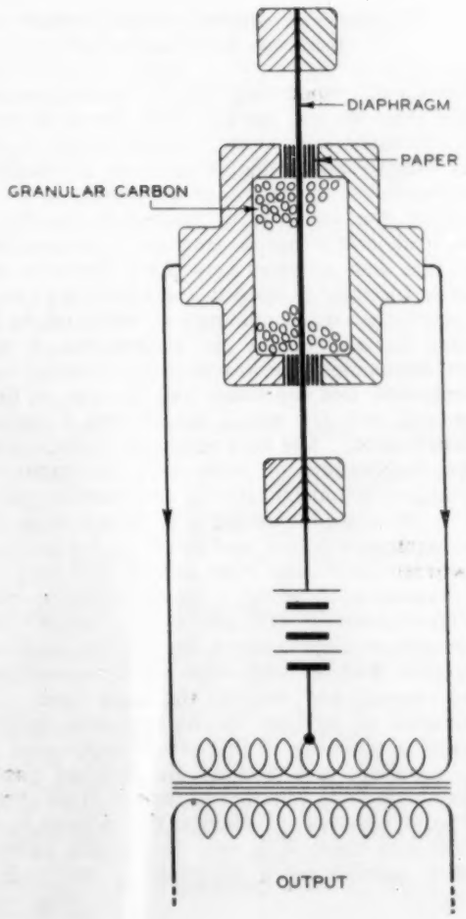


Fig. 1 (at left)—Cross-sectional view of the two-carbon-chamber stretched-diaphragm microphone.

Fig. 2 (below)—Schematic diagram of conventional electrical connections of the microphone in a push-pull circuit.



Equipment and Method

In order to apply a satisfactory gold electrode surface to the duralumin diaphragm by cathode sputtering commercially, it was necessary to develop a special cleaning process for the diaphragms and suitable equipment with multiple sputtering electrodes.

To insure proper continuity and adherence of the gold to the duralumin, the glossy roll finish on the duralumin is broken up by means of a brass wire scratch brush to give a matte surface. The diaphragms are then scrubbed in acetone, rinsed in ether, and rubbed dry with filter paper to remove all traces of oil or grease. Great care is then taken to keep the spot to be coated free from all contaminations before sputtering.

The unit developed for commercial sputtering is shown in operation in Fig. 3. A two-gallon bell jar fitted upon a heavy ground pyrex glass plate contains six glass-covered aluminum cathodes, the exposed parts of which are fitted with renewable gold discs (Fig. 4). An adjustable aluminum stand to hold the diaphragm fixture and shield is placed upon the plate directly below the cathodes. The shield covers all of each diaphragm except a central circular spot about ¾ inch in diameter. A vacuum is produced by means of a Megavac pump connected to the bell jar by ⅝ inch pyrex glass tubing, which is made as short as possible to facilitate rapid pumping. In the vacuum system are a small rotating McLeod gauge, a trap, a bleeder valve, and an anode. The anode consists of a 20-turn, ½ inch helix of No. 14 aluminum wire sealed into a one-inch tube at some distance from the bell jar. The end of the helix is shielded against high current density by a flanged piece of glass tubing. This type of anode has a life of at least two thousand hours.

In order to maintain a constant residual gas pressure, the pump is operated continuously and air is allowed to leak in slowly through the bleeder valve which is located near the pump. This practice was found necessary in

.100 ± .005 mm. is readily maintained by this method. After a new charge has been placed in the bell jar, the bleeder valve is temporarily cut off by closing a stop cock so that the required vacuum can be more quickly obtained.

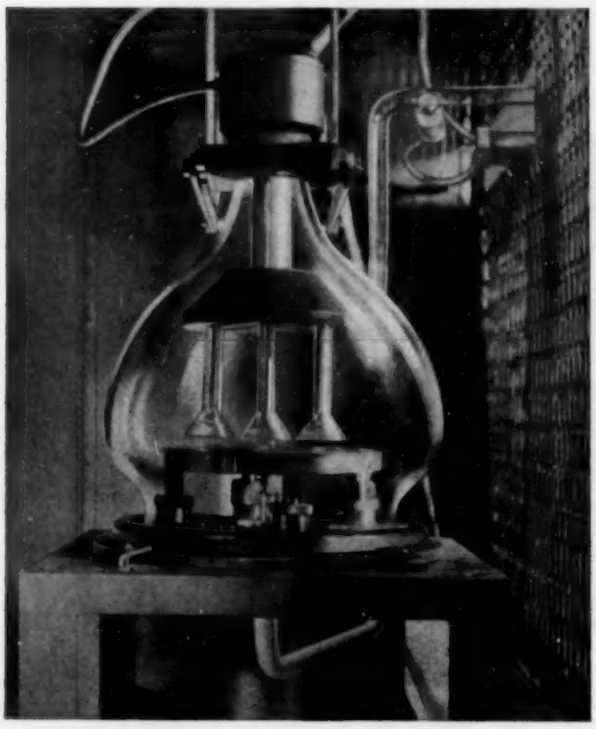


Fig. 3—The sputtering chamber, showing multiple electrodes, diaphragm holder and shield.

By this means, sputtering can be started in about four minutes after the bell jar has been placed in position.

The discharge is produced by means of a ½ kva transformer which steps up the voltage from 110 to 10,000 volts and is regulated by means of a rheostat in the primary. Safety for the operator is insured by having all high tension leads and terminals enclosed in an expanded metal cage. The door operates a switch in the primary circuit, so that as the door is opened, the circuit is broken.

In order that equal amounts of metal might be evenly deposited on each of the six diaphragms, it was necessary to determine experimentally the relative spacing of the electrodes, and the shape and the size of the shields, stands, and bell jar which would give a uniform current distribution. The best results were obtained by placing the diaphragms 5/8 inch from the cathodes, which are arranged symmetrically, by maintaining the pressure at .10 ± .05 mm., by having a ½ inch hole in the center of the diaphragm holder and shield, and a one inch clearance between their outer rims and the bell jar.

In commercial practice a single operator runs three units simultaneously and produces about 90 broadcasting microphone diaphragms a day. These diaphragms require a gold spot on both sides which necessitates breaking the vacuum and turning the parts over. The time not occupied in loading the fixtures and operating the equipment is taken up in preparing diaphragms for sputtering, marking, and packing the finished product. It requires about forty minutes to deposit from three to five mg. of gold per spot. Although this deposit is not more than .001 mm. thick, it is very continuous, adherent, and altogether suitable as a microphonic electrode surface (Fig. 6).

This equipment has been in successful operation for a number of years in the production of microphone diaphragms.

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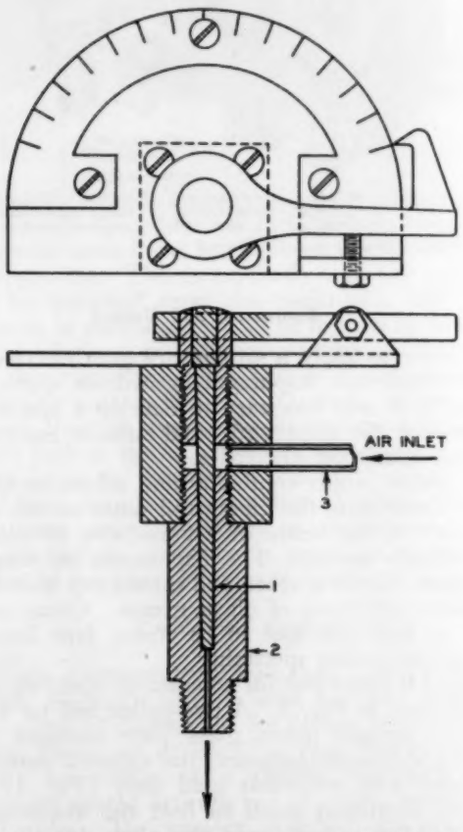

Fig. 4—Detailed construction of the bleeder valve.

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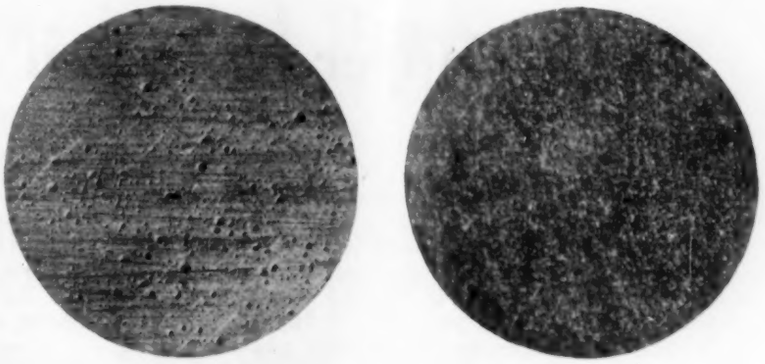

Fig. 5—Typical magnified gold surfaces after three months' service. The one on the left was produced by electrolytic plating and shows many blisters; the one on the right was produced by sputtering.

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Large Copper Hydrogen Welding Furnace

THE BUNDY TUBING COMPANY, Detroit, Mich., has recently announced installation of a copper hydrogen electric welding furnace, which promises to be revolutionary in its accomplishments, particularly when multiwelds and intricate assemblies have to be handled. It is made by General Electric Company, Schenectady, N. Y.

In copper hydrogen electric welding any number of steel parts having several joints can be welded together simultaneously. The steel parts are closely fitted together, copper powder or copper wire is laid around the joints and the article is then passed through an electric furnace, which is kept at a temperature somewhat higher than the melting point of copper, and in which a reducing atmosphere is constantly maintained.

The steel surface is first thoroughly deoxidized, the copper than melts and flows over the steel and into the joints. The iron and the copper next alloy together, some of the copper goes in solid solution in the steel, and some of the iron is dissolved by the copper to produce an integral alloy bond between the parts to be welded. The article is then cooled, also in a reducing atmosphere, thus preserving a clean steel surface, and the copper solidifies giving a strong continuous weld. Aiding the copper to flow completely through the joint to give a continuous, gas tight weld are the mutual affinity of copper for iron and of iron for copper, capillary attraction, the uniform temperature of the steel, and the deoxidized condition of the steel surface.

The new Bundy hydrogen electric furnace is of the semi-continuous pusher type and is entirely automatic. The entire unit is built in a steel shell six feet in diameter and approximately 82 ft. long, the first 20 ft. being the heating chamber, which is bricked in the shell, and the next 60 ft. the cooler, which is jacketed for water cooling. In order to minimize heat losses into the cooler, the heating chamber and the cooler are connected by a rectangular throat which is built of fire brick and insulation. The dimensions of the throat limit the size of the work that can be sent through the furnace to 17″ x 13″ x 30″.

The reducing gas is fed into the heating chamber at a point near the throat and flows out through the charging and discharging openings at both ends of the furnace. Nichrome ribbon resistors are mounted in loops on the side walls and on the floor of the heating chamber.

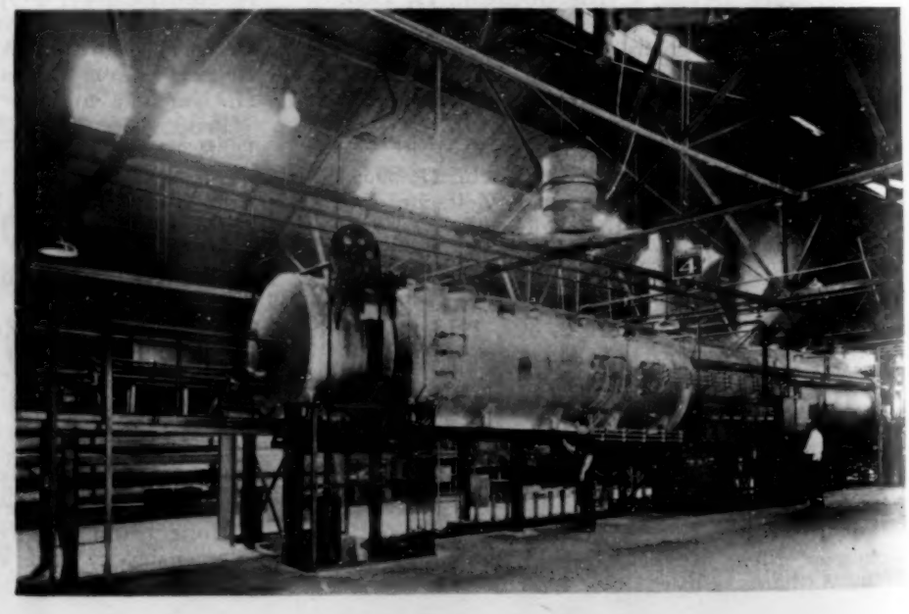
The work is carried on cars 2 ft. long, which are loaded on a lower conveyor running underneath the entire length of the furnace, and are pushed through the furnace on another double track disc-wheel alloy conveyor in a lower temperature chamber built beneath the floor of the heating chamber. The work is brought into the heat zone on supports which extend up from the cars through a longitudinal opening in the floor of the heating chamber.

An elevator at each end of the furnace brings the cars to the level of the upper and lower conveyors, and hydraulic pushers alternately move the train of cars on the conveyors one car length, and push the last car on the charging or on the discharging elevator.

Copper hydrogen welding produces results often unobtainable by any other welding method, such as gas-tight joints, good heat conductivity through the joints, ductility and strength. Due to the relatively high temperature of the process the steel is thoroughly annealed, is free from localized strains, and has clean, inside and outside, surfaces free from scales and oxides. Due to the high melting point of the welding metal the steel can be heat treated, or can be used at elevated temperatures without affecting the welds.

Articles that can be welded in a furnace of this type are almost unlimited. For instance, castings and forgings of very intricate designs can be made more economically by simply assembling together separate stampings of proper design and welding them.

This process is particularly adapted for the automotive and the refrigerating industries.



Zeppelin Copper Hydrogen Electric Furnace Recently Installed by the Bundy Tubing Company, Detroit, Mich. The Furnace Was Made by the General Electric Company, Schenectady, N. Y.

Petition for Rehearing in Chromium Case

On September 1, 1932, a petition for rehearing was filed in the United States Circuit Court of Appeals for the Second Circuit, by International Silver Company, in the case of United Chromium, Inc., vs. International Silver Company, involving the Fink patent No. 1,851,188 on chromium plating.

Phosphorus in Red Brass

By R. W. PARSONS

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The Data Secured Gave Evidence to Indicate That Phosphorus in Red Brass Actually Serves as a Deoxidizer in Addition to Making the Metal Fluid and Protecting the Molten Stream During Pouring

A PAPER READ AT THE MEETING OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION IN DETROIT, MAY 2-5, 1932

AT the nonferrous round table discussion of the American Foundrymen's Association held in Chicago in May, 1931, one question submitted was on the "Effect of phosphorus on brass and bronze, with special reference to slight traces of 0.01 to 0.02 per cent." It is understood that there was but little comment. As it seems to the writer that these amounts of residual phosphorus would be considerable in semi-red brass alloys of the modified 85-5-5-5 variety having zinc in excess of 5 per cent, it was felt that a report of such aspects of this question as have come under his observation might be of some interest.

It should be made clear at the outset that the alloy which the writer has in mind has the nominal composition of 81.5 per cent copper, 3 per cent tin, 7 per cent lead and 8.5 per cent zinc. Thus, it would fall within the classification as made by Thews[1] of those alloys which contain sufficient zinc so as not to require deoxidation in the molten bath but which require small quantities of phosphorus which act to prevent oxidation during the pouring period.

Phosphorus is rather widely used in foundry practice in the form of a phosphor-copper shot containing 10 to 15 per cent phosphorus, and in this paper the term "phosphorus" often is rather loosely applied to the phosphor-copper alloy as well as to the element.

Phosphorus is referred to freely in the literature as a deoxidizer for brass and bronze, and we frequently find recommended for red brass 1.5 oz. (0.1 per cent) of phosphor-copper per 100 lbs. of metal. Sometimes limits of 0.1 to 0.2 per cent are given, and occasionally considerably more is not considered detrimental.[2]

In the case of 0.1 to 0.2 per cent, which have been given as limits[1] for 10 per cent phosphor copper, this would mean that we would be adding 0.01 to 0.02 per cent phosphorus, of which considerable would be lost,[3] so that the amount retained would be on the order of a few thousandth of 1 per cent. In bronzes free from zinc or nearly so, the amount of phosphorus used often is several hundredths of one per cent.[3]

Phosphorus As a Deoxidizer[9]

Before relating the results of some practical tests made in this connection, it might be profitable to speculate to some extent as to the manner in which phosphorus functions, provided this can be done without the discussion becoming too theoretical and technical.

Affinity for Oxygen

A convenient measure of the ability of a given elementary metal to deoxidize may be had from a consideration of the heat of formation of the resultant oxide. These values may be found in any of several handbooks, and texts and compilations such as Table 1[5] have appeared previously in foundry literature.[1,4] The listed data on affinity, applying as they do to room temperatures, do not necessarily hold at the temperatures of the red brass melt, nor does it follow that the order of elements as given will be the same at elevated temperatures.

Table 1 indicates, however, that tin has a greater affinity for oxygen than has copper and, therefore, should deoxidize copper as it is generally accepted that it does. It will be noted, however, that the resultant oxide has a very high gravity as compared to the others listed, and we should not expect it to free itself from the red brass melt (which has a gravity in excess of 8.0) as readily as a lighter oxide, such as that of zinc.

This is one reason for the marked improvement in casting properties brought about by additions of zinc to the tin bronzes, as in the case of Navy G bronze. Since tin oxide is known to be hard and is apt to dull the tools during machining,[4] considerable phosphorus usually is added to deoxidize the tin bronzes and aid in the elimination of this objectionable oxide.

TABLE 1.[5] ABILITY OF ELEMENTARY METALS TO DEOXIDIZE

		Heat of Formation Oxide.		Properties of Oxide.	
Element.	Oxide.	Calories per Gram Molecule.	Calories per Gram Atom of Oxygen.	Melting Point, degs. Fahr.	Specific Gravity.
Calcium	CaO	151.9	151.9	4600	3.3
Magnesium	MgO	143.9	143.9	5000	3.4
Aluminum	Al_2O_3	392.6	130.8	3700	3.9
Titanium	TiO_2	218.4	109.2	2800	4.2
Silicon	SiO_2	191	95.5	3100	2.2
Boron	B_2O_3	272.6	90.8	1070	1.8
Manganese	MnO	90.8	90.8	3000	5.1
Zinc	ZnO	84.8	84.8	3300	5.4
Phosphorus	P_2O_5	365.2	73.0	Sublimes	2.4
Tin	SnO_2	137.2	68.6	2050	6.9
Iron	FeO	65.7	65.7	2600	6.9 ?
Nickel	NiO	57.9	57.9	?	6.7
Copper	Cu_2O	43.8	43.8	2100	5.9

Aluminum and silicon, although ranking high as regards their affinity for oxygen, are not to be considered, of course, for red brass in view of their unfortunate reactions with the lead.[2, 3, 6] Magnesium probably is not a desirable impurity in red brass.[9] Metallic boron, if it were available, would seem a logical choice for investigation.

[1] For all footnote references, see conclusion of this paper on page 435.—Ed.

Zinc and phosphorus appear to have considerable affinity for oxygen and are good deoxidizers for red brass, with the former apparently a trifle superior. Of those listed, only these two elements have boiling points below the temperature of the red brass melt (phosphorus, 550 degs. Fahr.; zinc, 1688 degs. Fahr.) The oxidation products are sufficiently light so that they should be able to free themselves from the melt without any great difficulty.

Oxide of Phosphorus Is Light

It will be noted that the oxide of phosphorus is extremely light (second only to boron), and in addition it sublimes instead of melting. Apparently the deoxidizing action of zinc, which is added in such relatively large quantities, should leave the melt (to all practical purposes) free from oxides, insofar as phosphorus additions are concerned and in view of the small amounts of the latter used. Why is it, then, that phosphorus is used to deoxidize red brass?

TABLE 2. CAPACITY OF ELEMENTS FOR OXYGEN

In forming the oxides given in Table 1:

1 oz. of Boron	takes up 2.18 oz. of Oxygen
1 oz. of Phosphorus	takes up 1.29 oz. of Oxygen
1 oz. of Silicon	takes up 1.13 oz. of Oxygen
1 oz. of Aluminum	takes up 0.886 oz. of Oxygen
1 oz. of Titanium	takes up 0.665 oz. of Oxygen
1 oz. of Magnesium	takes up 0.658 oz. of Oxygen
1 oz. of Calcium	takes up 0.400 oz. of Oxygen
1 oz. of Manganese	takes up 0.291 oz. of Oxygen
1 oz. of Iron	takes up 0.287 oz. of Oxygen
1 oz. of Nickel	takes up 0.273 oz. of Oxygen
1 oz. of Tin	takes up 0.270 oz. of Oxygen
1 oz. of Zinc	takes up 0.245 oz. of Oxygen
1 oz. of Copper	takes up 0.126 oz. of Oxygen

Capacity of Phosphorus for Oxygen

Table 2 presents the matter in a little different light in that the capacity of the various elements for oxygen is shown. Here, other things being equal the lighter the element, the greater its capacity. We see that phosphorus is second only to boron and considerably ahead of zinc.

Even if the phosphorus trioxide (P_2O_3) is considered, the value still would be 0.773, which would not alter its position from a practical standpoint since silicon and aluminum are automatically eliminated as possibilities. Even though the capacity of phosphorus for oxygen is five times that of zinc, the ratio of phosphorus to zinc used in the foundry is much less than 1 to 5, so that our question is still not answered.

Action of Phosphorus in Removing Oxides

Just what the action of phosphorus may be certainly is debatable, although reference to some of the available theories and information may suffice to shed some light on the subject. Clearly, copper oxide should not exist in the presence of tin, nor should tin oxide be found where there is excess zinc. It may be that contradictory evidence is on record, in which case we might safely assume the presence of traces of oxides of copper on which phosphorus is known to act.

It has been stated[7] that phosphorus will deoxidize the oxides of tin and zinc, provided the particle sizes are such that they come into sufficiently close contact in the temperature of the red brass melt. Elsewhere[8] this is denied, and the removal of these oxides by phosphorus is held to be purely mechanical.

Another suggestion has been put forward[4] to the effect that the oxides of tin and zinc are removed by the formation of a fluid phosphate slag. The same authority,[4] after observing but little volatilization of phosphorus in the absence of oxygen, reasons that surface oxidation of the molten stream is inhibited not by an evolution of phosphorus forming a protective envelop, as has been suggested,[1] but that the oxidation products which are of the molten phosphate type furnish the protection.

As an additional point in connection with the oxide skin formed during pouring, we may consider the case of the oxide film on aluminum bronzes which may become folded into or rolled up in the metal during casting, unless pouring, gating and sand conditions are such as to admit the metal with a minimum of disturbance. It is this same aluminum-oxide film on aluminum-contaminated red brass that, during pouring, rolls up to form the inclusions which cause the excessive leak loss in such cases.[2]

It is fairly certain and capable of visible proof that, during pouring, the presence of phosphorus prevents the formation of an oxide film on the stream of metal. This property is of special interest in the present discussion, since the forthcoming practical tests deal with oxide inclusions that caused leakers. Whether it is felt that such inclusions are formed during the pouring of the mold or that the oxides are present prior to pouring, charged into the furnace or formed there, both suppositions doubtless are partially correct and the fact still remains phosphorus is beneficial in either event.

Method of Making Tests

The program to be described was undertaken to determine the underlying cause of excessive leak losses which resulted from the presence of greenish-colored inclusions in the thin sections of valve castings. As it was anywhere from two to six weeks or more between the pouring of the castings and their arrival at the test benches, it was extremely desirable to have some means of which the leak-loss information could be obtained immediately.

A foundry floor was set up on which to make the castings, and a multiple pattern of a small competition globe-valve body, with sections of such thinness that the test losses were above the average, was selected to be the basis for all tests. The castings then were poured, cleaned, ground and tested in a very short time as described below.

Usually ten molds (120 castings) were poured from experimentally melted metal, and in order to avoid misleading test information, a system of handling was employed so that it would be possible to determine at all times the mold (in order of pouring) from which a given casting came, as well as the position of the casting in the mold relative to the runner and sprue. The effect on leak loss of defective molds or faulty pouring of molds thus was a known quantity.

Valve castings, with the center and pipe ends ground smooth, were tested in the rough by clamping a rubber-faced disk over the center end; the leakers were carefully examined to insure that shrinks or porous metal were not responsible. A large lot of rough castings which had passed the pressure test, ultimately was sent through the regular channels in order to prove that the bright dipping, reduction of wall thickness and removal of outer skin by machining were of no practical importance. The leak loss on the lot was 0.27 per cent, half of which was due to castings cracked during machining.

Experiments With Indirect-Arc Furnace

Starting with a capacity heat of all new metals in a small indirect-arc furnace, ten molds of castings were poured without phosphorus additions and the remainder

of the heat poured into pigs. The gates, sprues and pigs were then remelted in the same furnace and again ten molds were cast without a phosphorus addition.

This procedure was continued until, at the end of the fifth remelt, there was insufficient metal for another lot. The metal all was sluggish, although less so after the fifth remelt; and the foundry scrap, although varying somewhat, was normal throughout the five lots.

Remelting Removes Oxides

The interesting fact was that the percentages good on the pressure test for the five groups of castings were, in order 52.3, 70.0, 95.8, 95.8 and 97.7 per cent. Fractures through the defects showed oxide inclusions in all cases.

It thus was demonstrated that, by continuously subjecting prime metals to the reducing atmosphere which characterizes this type of melting equipment,[10] the metal could be deoxidized almost to the point of being satisfactory without phosphorus additions.

It was felt that conclusive proof was obtained that phosphorus does more than merely protect the molten stream during pouring, and that phosphorus additions bring about actual deoxidation in the furnace or ladle.

Phosphorus Removes Oxides

New metal heats to which 0.1 per cent of phosphor copper (15 per cent phosphorus) was added gave better results (with 99 per cent of the casting good on the test) than those with 0.05 per cent (which showed 94.5 per cent good). In a production way the latter amount was ample, since a charge usually is about half remelted material. Fluid metal was obtained in either case and the residual phosphorus was a few thousandths of one per cent.

A heat composed entirely of scrap castings which were leakers was melted in the arc furnace and 0.1 per cent of phosphor copper added. The castings from the heat were 99 per cent good on the test, the foundry loss was 4 per cent, and the residual phosphorus was 0.004 per cent. Remelted leakers, with 25 per cent new metals and without a phosphorus addition, produced castings having an identical foundry loss but which were only 46 per cent good on the test.

This is further evidence that heats containing new metal, either wholly or in part, need to be deoxidized with phosphorus to produce satisfactory results. The copper ingot, which is poled only to a flat set and contains approximately 0.04 per cent oxygen[8] in typical American wire bar, doubtless is the principal source of the oxygen in prime metal heats.

Excess Phosphorus Gives Trouble

Starting with an all-new-metal heat, and adding 0.1 per cent of phosphor copper to the first ladle, 0.15 per cent to the second and 0.2 per cent to the third, gave castings which were 99 per cent good on the test. Foundry losses (due to dirt) were normal in all three instances. The residual phosphorus was 0.01 per cent in the two latter cases.

However, when 0.2 per cent of phosphor copper was added each time and continuous remelting practiced, as in the first test mentioned, metal was produced on the fourth remelt which had no desire to remain in the ladle. The residual phosphorus at this point was 0.022 per cent and the metal was "wild" (very smoky) and active in the ladle (as if the ladle were wet).

The metal attacked the ladle lining, boiling up "dirt" which could not be prevented from entering the mold. Exclusive of this "poured in dirt," which left visible holes in the casting, the leak losses were quite low; but the "dirt" loss in the foundry mounted with each remelt to 47 per cent at the point of maximum wildness.

Reducing the pouring temperature 100 degs. Fahr. (from 2,100 degrees) after a fifth and final remelt, "tamed" the metal to normal. The castings were 100 per cent good on the test and 99 per cent good from the standpoint of "dirt," although there were a few misruns and cold shuts.

Experiments With the Induction Furnace

The induction melting unit lends itself very nicely to additions of phosphorus in the furnace, just before pouring, and in some circles[3] this is considered desirable. If one-tenth pound is to be added to one hundred pounds of metal, half of this amount is charged into the furnace perhaps 5 minutes before pouring, and the balance is added to the ladles.

It was found, as has been stated previously,[3] that phosphorus is eliminated rather rapidly from the metal at pouring temperature. With 0.006 per cent in the "button" (the metal left from the previous heat), 0.004 per cent was present after the heat was all molten; and, although 0.1 per cent of the phosphor copper was added prior to pouring, only 0.003 per cent remained as residual phosphorus in the castings.

The leak loss was found to be proportional to the length of time that the phosphorus addition remained in the furnace before pouring. With 0.1 per cent added, the castings from a ladle poured 5 minutes later were 100 per cent good on the test, whereas, when the elapsed time was 10 to 15 minutes, only 89 to 97 per cent good castings were obtained.

Conclusions

The evidence would indicate that phosphorus in red brass actually serves as a deoxidizer, in addition to making the metal fluid and protecting the molten stream during pouring. Various theories are presented as to the mechanics of this deoxidation.

The copper, in new metal heats, is the principal source of oxygen when the melting is under reducing conditions, and either remelting or an addition of phosphorus is necessary to remove the oxides and produce sound castings free from inclusions.

For the alloy in question which nominally contains 8.5 per cent zinc, the amounts of phosphor copper required are on the order of 0.05 to 0.1 per cent. Since the phosphorus is lost rather rapidly when the metal is at pouring temperature, the residual phosphorus resulting from this practice varies from 0 to 0.007 per cent.

In the arc furnace, when 0.2 per cent of phosphor copper is used continuously, the metal eventually becomes wild and the foundry losses may go as high as 47 per cent "dirt." The residual phosphorus at this point is in excess of 0.02 per cent.

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[1] E. R. Thews, "Deoxidizing Agents and Reactions," "Metal Industry," London, vol. 35, no. 24, Dec. 13, 1929, pp. 559-561.

[2] H. M. St. John, "The Influence of Impurities in Foundry Brasses and Bronzes." "Metals and Alloys," vol. 2, no. 4, October, 1931, pp. 242-245.

[3] E. R. Thews, "Phosphorus as a Deoxidizer," "Metal Industry," London, vol. 36, no. 15, April 11, 1930, p. 401; also no. 17, April 25, 1930, p. 449.

[4] G. L. Bailey, "Metal Industry," London, vol. 40, no. 2, Jan. 8, 1932, pp. 31-34 (Cont.).

[5] Data gathered chiefly from "Handbook of Chemistry and Physics," published by Chemical Rubber Co., Cleveland.

[6] J. W. Bolton and S. A. Weigand, "Effect of Oxidation and Certain Impurities in Bronze." A. I. M. E. "Technical Pub. No. 281," 1930, 17 pp.

[7] Falkenstërfer, "Metallwirtschaft," vol. 10, 1931, p. 130.

[8] W. F. Brazener, "Casting Tough Pitch Copper," "Metal Industry," London, vol. 39, no. 24, Dec. 11, 1931, p. 561.

[9] C. V. Nass, "Magnesium as Brass Deoxidizer," "The Foundry," vol. 53, no. 13, July 1, 1925, p. 527.

[10] J. W. Bolton and S. A. Weigand, "Incipient Shrinkage in Some Nonferrous Alloys," A. I. M. E. Technical Pub. No. 163, 1929.

Powdered Metals By Electrolytic Methods

By Dr. JOSEPH ROSSMAN
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An Extended Review of the Patents Covering This Method of Manufacturing a Material Which Has Aroused Great Interest and Seems to Have a Wide Field—Part 3*

18. 1,794,585, Cain. Mar. 3, 1931.

The inventor states that when metal powders are moistened with benzol and dried they will float on an aqueous electrolyte. The floating powder can be used as a cathode on which any metal may be deposited. The inventor states: "If for example, I produce an iron powder with the benzol treatment and drying as noted, and then deposit it upon a copper electrolyte, I find that the iron rapidly disappears and the copper forms in its place. This powder when lifted off and dried in a gentle heat will be found to retain its floating characteristics for a considerable period."

19. 1,799,157, Drouilly. Apr. 7, 1931. (British 303,984. French 656,777. German 520,835.)

Copper, zinc, cadmium, tin or lead powders are obtained by electrolyzing a solution of the desired metal to which is added a carbonaceous colloidal product made by heating glucose with sulfuric acid.

The German patent gives the following example: 1 gm. glucose is heated on a waterbath with 50 c.c. sulfuric acid 66 degrees Bé. After cooling it is diluted with 300 c.c. water. This solution is added to a copper sulfate solution containing 20 to 60 gms. of the salt and 30 to 60 gms. sulfuric acid per liter. The bath should contain 50 c.c. of this solution per liter. Copper anodes and cathodes are used at a current density of 2.5 to 3.5 amp. per sq. cm. at 2.5 volts. The temperature of the bath is 35 to 55 degrees C.

20. 1,804,924, Fitzpatrick. May 12, 1931.

Pure fine copper powder is prepared in three steps (1) formation in an electrolytic cell, (2) washing free from the electrolyte, (3) drying. The following example is given: The tank used was constructed of wood lined with sheet lead. The inside dimensions were 36″ by 18″ by 36″ depth at one end and 40″ depth at the other end. A 4″ outlet was placed at the lower end for removal of the precipitate. The anodes consisted of six copper plates each 12″ wide and submerged 24″ below the surface of the electrolyte; thereby providing an anode surface of 12 square feet. The cathodes consisted of 12 copper rods each ⅛″ in diameter and submerged 24″ in the electrolyte; thereby providing a cathode surface of approximately 2.356 square feet. The anodes and the cathodes were connected respectively in multiple and were connected to a suitable source of electric current. The electrolyte varied in composition from 2.29 per cent to 2.45 per cent of copper (as copper sulphate) and from 11.32 per cent to 11.43 per cent sulphuric acid.

The cell was operated for 90 hours, and the average current used was 893.75 amperes at 1.50 volts, with the average electrolyte temperature at 129.3 degrees F. The current density at the anodes averaged approximately 74.48 amperes per square foot; while the current density at the cathodes averaged approximately 379.35 amperes per square foot. No artificial circulation was used in the cell; the only circulation being that caused by gassing at the electrodes. The cathodes were rapped every 15 minutes to dislodge the copper sponge or slime and the cell was shut down once each day to clean out the precipitate from the bottom of the tank.

The copper slime or sponge thus removed was placed in a gravity filter and washed free from the electrolyte by circulating water through it; care being taken to keep the finely divided copper particles submerged to prevent oxidation. The washing was continued until the water showed no trace of sulphates, this being determined by testing with barium chloride.

It has been found to be highly desirable, that the temperature of the water used for washing should be kept below 120 degrees F., as above this temperature considerable oxidation takes place; and likewise it has been found that boiled water should be used for washing.

The washed material was placed in copper pans, in layer of ½″ thickness and with ½″ water standing above it. The pans were then placed in a cold vacuum dryer, the dryer closed and the vacuum brought up to about 26″ of mercury. After this vacuum had been reached, the steam was turned on and the temperature of the dryer was brought to the boiling point of the water, which at this pressure was about 125 degrees F. This method of keeping the material covered with water before drying is likewise deemed to be very desirable. In order to prevent oxidation extreme care was taken to keep the material at all times free from contact with air above 110 degrees F., and therefore for this and other reasons the dryer was evacuated before the temperature of the material was raised. By noting when the formation of condensate stopped in the vacuum dryer condensers it was determined when the material was completely dried.

The material was then removed from the vacuum dryer and the finely divided copper powder thus produced was screened through a 160 mesh screen. The material which passed the screen amounted to 175 pounds. The resultant product averaged 99.56 per cent purity, and in some instances was as high as 99.75 per cent pure. The resulting product of pure finely divided copper particles is not easily susceptible to atmospheric oxidation when in dry form and is therefore quite stable; being also free from any extraneous substance.

This Review will be continued in an early issue.—Ed.

*Parts 1 and 2 were published in our August and October issues.—Ed.

Some Attempts at Making Beryllium-Magnesium Alloys

By RONALD J. M. PAYNE and JOHN L. HAUGHTON

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A Description Is Given of Various Methods Which Were Tried for the Production of Beryllium-Magnesium Alloys, All of Which Were Unsuccessful

A PAPER READ AT THE MEETING OF THE BRITISH INSTITUTE OF METALS, LONDON, ENGLAND, SEPTEMBER 12-15, 1932

OWING to the low densities of magnesium and beryllium and to the remarkable results obtained by the addition of the latter element to copper, various workers have tried to produce alloys of beryllium and magnesium, but so far as the authors have been able to find, without success.

The high melting point of beryllium and the low boiling point of magnesium preclude the melting together of the metals, at any rate under normal pressures, and no action appears to take place between solid beryllium and molten magnesium. Thus, Knoll and Jess* found that lumps of beryllium were entirely unattacked after prolonged heating in boiling magnesium. This was confirmed by the authors.

It was thought possible that if molten beryllium were poured into molten magnesium, the intimate contact of the two metals obtained might result in the formation of an alloy on subsequent annealing of the mixture. Some beryllium was therefore melted (*in vacuo*) in a high-frequency furnace and poured into a pot of molten magnesium; the mixture was well stirred and quickly cast into a steel mould. A portion of the material thus obtained was prepared for microscopic examination, which revealed the beryllium, in the form of small lumps possessing clear-cut edges, irregularly distributed throughout the magnesium. A piece of the casting was then annealed at a temperature of 600° C. for a period of 7 days, and although there were some slight indications of attack at the boundaries of the included beryllium, the mixture was in sensibly the same condition as that which obtained before annealing. Filings secured from the annealed material were given a further short heat-treatment to remove the effects of coldwork and subjected to X-ray examination. From lattice measurements it was concluded that no beryllium was dissolved in the magnesium.

It was considered that the mutual grinding of the surfaces of adjacent pieces of metal, when a mixture of beryllium and magnesium were briquetted in a press in a hydrogen atmosphere, might have the effect of abrading any existing oxide film. This treatment, however, yielded only lumps of beryllium set in magnesium—apparently no diffusion takes place even after prolonged annealing.

The scheme of electrolytically depositing beryllium on to a cathode of molten magnesium was suggested to the authors by Dr. W. Rosenhain, it being hoped that the nascent beryllium might attack the latter metal. It was intended that the magnesium should float on the stock bath of fluorides and oxides used for the preparation of beryllium, and that the latter metal should be deposited on the under surface of the magnesium. The act of adding magnesium to the molten bath, however, caused the bath itself quickly to become pasty and ultimately quite hard. An American publication, "Chemistry of Beryllium," came to hand at this juncture, in which it was stated that magnesium possessed the power of reducing beryllium fluoride, and that in the presence of excess magnesium an alloy would be obtained. The scheme was put forward as a method of preparing beryllium and was protected by patent rights. To test the claim some of the feed material used for the beryllium deposition bath, and consisting of a mixture of sodium and beryllium fluorides, was crushed and added to a crucible of molten magnesium. A slight exothermic reaction appeared to take place, the added material glowing visibly, and a hard infusible residue was left together with the metal in the crucible. The metal so obtained was cast and examined microscopically. Very small black specks were seen on a background of magnesium, but a chemical analysis showed the presence of no more than 0.07 per cent beryllium, an amount which might readily be present in the form of included fluoride. In another similar experiment a beryllium content of 0.14 per cent was found. In yet another attempt, this time using pure beryllium fluoride, 0.05 per cent beryllium was found on analysis.

Wiss. Veröff. Siemens-Konzern, 1931, 10, (2), 29-32.

Summary.

It will be seen that all attempts to introduce beryllium into magnesium have proved abortive. It is just possible, however, that the problem might be solved by the simultaneous electro-deposition of magnesium and beryllium on to the same cathode.

Foundry Casts Everdur

Last issue we gave a report of the Institute of Metals Division Meeting at Buffalo. We used some illustrations representing the types of products which were displayed at the National Metal Congress, in connection with which the Institute meeting was held. We neglected, through lack of data, to state in connection with the picture of Everdur castings shown on page 388 that these were produced at the foundry of Thomas Paulson and Son, Inc., Brooklyn, N. Y. The company is equipped for production of practically any size or shape of Everdur casting.

Analysis of Free Cyanide in Brass Plating Baths

By L. C. PAN

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A Check-Up of the Four Methods of Analysis Now in Use, and Comparisons of Their Value—Conclusion*

THE POTASSIUM IODIDE INDICATOR—The Liebig method has a poor end-point. In order to improve the end-point and avoid interference by impurities present in the brass solution, Clennel and Sharwood[16] recommended for each titration 0.1 g. potassium iodide together with ammonia as indicator. Wick[17] recommended 0.2 g. potassium iodite for the cyanide silver solution, and Thompson[18] recommended 1 g. of potassium iodide in a titration mixture of 100 ml. None of the work, however, was done on brass solutions. In applying both Wick's and Thompson's modifications of the Liebig method, the writer found that results vary considerably with the concentration of potassium iodide in the mixture. So an investigation was made on the effect of concentration of potassium iodide upon the accuracy of free cyanide determination for brass solutions. A series of experiments was carried out, using the same standard brass solution as given above, and a standard 0.1005 N silver nitrate reagent. Various amounts of potassium iodide were added to the 10 ml. sample of brass solution, together with a predetermined amount of water, so that the final volume after end-point is reached was always equal to 70 ± 1 ml., thus eliminating any possibility of error due to dilution. It was found then that the presence of potassium iodide first increases the results of titration sharply until it comes to a maximum at 0.5 g.KI, and then it falls down to a minimum at 4.3 g.KI and rises again, with further increase of KI. At the maximum point the curve is practically flat between 0.18 g. and 0.8 g.KI. Although silver iodide is known to be insoluble in potassium iodide, the higher results of free cyanide content at high concentrations of potassium iodide may indicate some solvent action of the latter chemical upon silver iodide, especially in a mixture with cyanides. It may be noted from Fig. 5 that the minimum point at 4.3 g.KI coincides with the true value of free sodium cyanide content. This suggests the use of 4.3 g. potassium iodide as indicator and a total volume of titration mixture of 70 ml.

The effect of dilution on the results of titration in the presence of high potassium iodide (2.5 g. in the titration mixture) is similar to that in the absence of potassium iodide, although only the rising part of the curve is shown in Fig. 1. (See the METAL INDUSTRY, October, page 403.) To all indications, such as the apparent straight line relationship, the higher results of free cyanide are due to solubility of silver iodide in the mixture. Even though silver iodide is known to be extremely insoluble, its behavior in a mixed cyanide solution is yet to be determined.

Incidentally, the end-point in titration is much sharper with high potassium iodide concentration. This is a decided advantage, especially for rapid work. The sharp end-point eliminates any possible danger of over-titration. But such sharp end-point is not possible with low iodide concentrations as commonly used for silver and copper plating solutions.

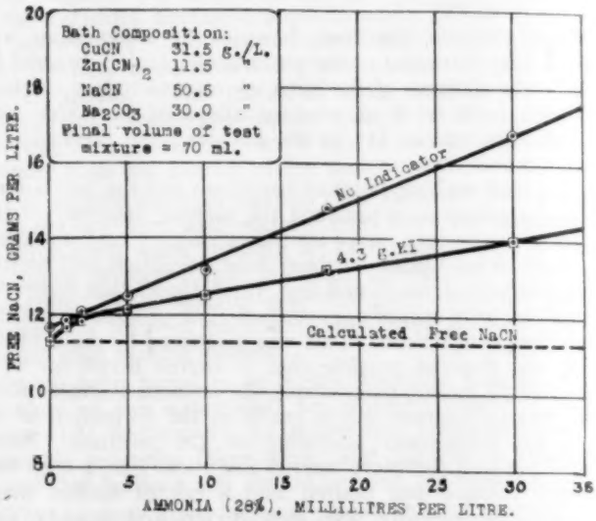


Fig. 4. The Effect of Ammonia Upon the Free Cyanide Test for Brass Solutions.

For further test of the accuracy of the high and low iodide methods of titration, they were applied to brass solutions of various free cyanide, carbonate, zinc cyanide and ammonia contents. These solutions were the same ones used in the study of the original Liebig method.

At various free cyanide concentrations the high iodide method and the original Liebig method, results were close to the theoretical or calculated values. With low iodide concentration, however, the results were almost invariably higher than the theoretical ones (Fig. 6). Similar relationship between the three methods holds at various carbonate and zinc cyanide contents (Figs. 2 and 3). See the METAL INDUSTRY, October, page 403.)

The effect of ammonia upon titration with high iodide indicator is not as great as when no iodide was used; in fact, it is only one half as much (Fig. 4) and amounts to 2 drops (or 0.1 ml.) of 0.1 N silver nitrate reagent for every ml. of ammonia present in a liter of brass solution. Since ammonia in brass solution seldom reaches beyond a few cc per litre, the error so introduced will not be large. As in other cases, the end-point is far more distinct when potassium iodide is present in high concentration.

The silver iodide formed during titration is apparently less soluble in the mixture containing ammonia than the silver cyanide in the case of the original Liebig method.

*Part 1 was published in our October issue.—Ed.

[16] Loc. cit.

[17] Loc. cit.

[18] Loc. cit.

The effect of ammonia upon the error produced by it is in both cases a straight relationship which is in line with the theory that the solubility of a silver compound AgCN, or in this case silver iodide in the titration mixture containing ammonia, is due to the formation of soluble silver ammonium complex, and according to the present data as represented in Fig. 4, it might be that in

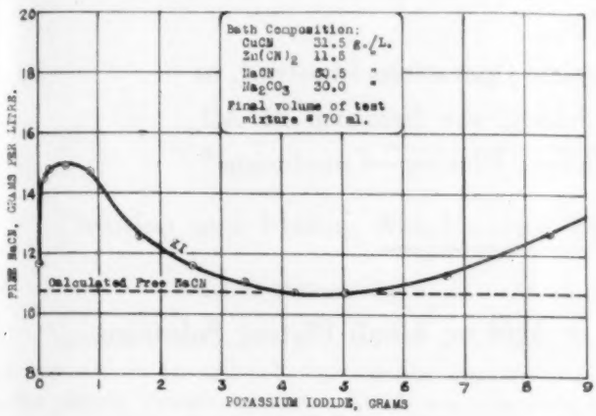


Fig. 5.—The Effect of Potassium Iodide Upon the Free Cyanide Test for Brass Plating Solutions.

the absence of iodide the complex is $Ag\text{-}NH_3\text{-}CN$, and in the presence of iodide, it is $Ag(NH_3)_2I$.

Titration of Free Cyanide Against Copper Sulfate

The purpose of using copper sulfate as a standard reagent was to eliminate if possible the interference by carbonate, ammonia, etc., as in the case of silver nitrate method. The reaction of copper sulfate upon free sodium cyanide in the absence of much ammonia seems:

$$2CuSO_4 + 6NaCN + H_2O \longrightarrow NaCu(CN)_2 + Na_2Cu(CN)_3 + NaCNO + 2Na\ HSO_4$$

Thus, 1 mol of copper sulfate is equivalent to 3 mols of free cyanide. The strength of copper sulfate reagent may be calibrated in any of the following three ways: (1) Against c.p. sodium cyanide; (2) against metallic copper through sodium thiosulfate as an intermediate step; (3) against standard silver nitrate through a pure sodium cyanide solution as a temporary standard. In the present work, the second method was used and checked by the third method. Five brass plating solutions were prepared using c.p. chemicals for the purpose of checking the accuracy of the copper sulfate method as well as other methods for free cyanide. The compositions of the five solutions are as follows:

	g/l.
Copper cyanide	31.5
Zinc Cyanide	11.5
Sodium carbonate	30.0
Sodium cyanide....42, 46, 51.5, 55, 65, respectively	

Computed on the basis of $Na_2Cu(CN)_3$ and $NaZn(CN)_3$ as the complex cyanides formed, the free cyanide contents in the above five solutions are given in Table I, Column (1).

Upon analysis by the copper sulfate method, these solutions showed free cyanide values as given in Column (2), Table I. The agreement between the latter values and the theoretical ones was only fair. The same solutions were then analyzed for free cyanide against standard silver nitrate reagent with 4.3 g. potassium iodide for each titration, from which analyses results as recorded in Column (5), Table I, were obtained. This time the agreement between the latter method and the copper sulfate method was almost perfect. All these observations together with those using small amount of potassium iodide, as also shown graphically in Fig. 6, indicate that copper sulfate could be used for the estimation of free cyanide in brass solutions. A little turbidity in the titration mixture is the end-point, but it takes 10 to 15 seconds to develop, therefore, titration must be run very slowly to allow precipitate to form and to avoid overstepping the end-point.

TABLE I. FREE SODIUM CYANIDE OF BRASS PLATING SOLUTIONS, IN GRAMS PER LITRE.

(1) Theoretical Values	(2) By $CuSO_4$ Titration	(3) By Liebig Method	(4) By $AgNO_3$ + 0.18 g. KI	(5) By $AgNO_3$ + 4.3 g. KI
2.86	4.15	1.68	3.1	4.04
6.86	6.33	6.52	9.45	7.29
11.11	9.77	11.73	14.8	10.58
15.86	14.25	14.6	17.14	14.3
25.86	23.5	24.75	27.1	23.9

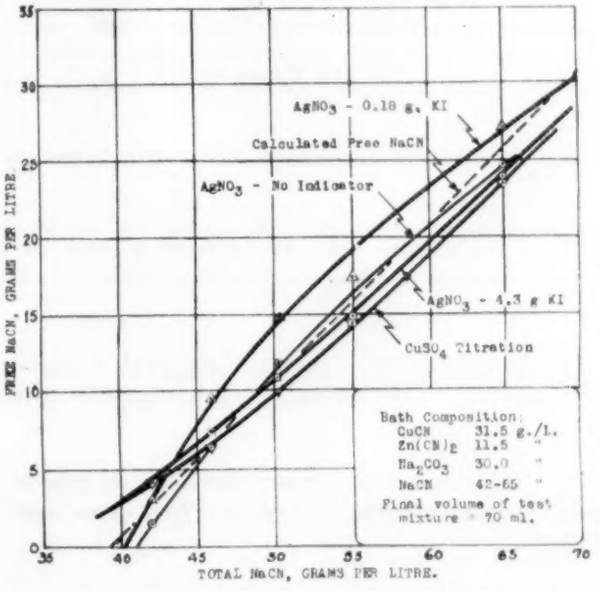


Fig. 6.—Comparative Results of Free Cyanide Tests Using Various Reagents.

Conclusions

Among the four methods of analysis of free cyanide in brass plating solutions, the Liebig method gives consistent results, checking very closely with the theoretical values of free cyanide, but the end-point is not sharp.

Small amounts of potassium iodide added to the brass solution for titration against silver nitrate improves the end-point, but throws it off the correct position.

Titration against silver nitrate with a large amount of potassium iodide as indicator gives the sharpest end-point and results most close to the theoretical values. This method shows the least interference by the presence of ammonia and carbonate and by the zinc content.

Titration against standard copper sulfate solution gives apparently sharp end-point and very consistent results at a slight deviation from the theoretical free cyanide values, but the end-point lags in time, so that it is necessary to allow 15 to 20 seconds after each addition of the reagent for the equilibrium to restore.

In all these four methods, dilution plays an important part. All analyses should be made at a fixed volume. If potassium iodide is to be used as indicator with silver nitrate titration, it should be added in fixed amounts, preferably making its concentration to 0.37 N.

The Preparation of Metals for Electroplating

A Complete Schedule of the Practical Operations Involved, in the Cleaning of Metals of All Kinds, the Removal of All Types of Dirt, Oil and Grease Before Plating—Conclusion*

Cleaning and Plating Ferrous Metals in Acid or Alkali Plating Solutions

For Acid Plating Solution	For Alkali Plating Solution
1. If insolubles are present, hand wash in solvent or in a spray-type metal-washing machine. See paragraph 3.	
2. Clean in tank solution (with or without electric current) of proper grade of cleaner. Choice of grade of cleaner depends on nature of oils to be removed. Work must be chemically clean and pass the water break test.	
3. If inert matter is present, hand swab in cleaner solution. Operation No. 1 can be eliminated when done in this manner. The method selected is a matter of choice by plant management and workmen.	
4. Either hot or cold rinse, depending on type of cleaner used. (Cleaners containing soap require hot rinse to produce chemically clean surface.) Two rinses, hot followed by cold, are most desirable and are frequently used on high-class work.	
5. Pickle in five per cent muriatic acid or five per cent sulphuric acid to remove rust, oxides, scale, etc., at any temperature up to 140° F. (60° C.). Hot pickles work faster.	
6. Hot rinse. Sometimes followed by cold rinse.	
7. If work has been stamped, the pickle may uncover oil in the pores of the metal at the bends. (Stamped work which appears chemically clean prior to pickling sometimes shows not chemically clean after pickling.) In this case reclean in tank solution to produce a chemically clean surface. On large production a separate tank is used for this final cleaning operation. Solution may be operated with or without electric current.	7. Neutralize pickling acid in alkali solution. Best practice is to neutralize in caustic soda (two ounces per gallon) or a combination of caustic soda and sodium cyanide in the same proportion as used in the subsequent plating solution. For example, if the plating solution is made up of caustic soda two parts and sodium cyanide nine parts, make a mixture composed of two parts caustic soda and nine parts sodium cyanide and then use two ounces per gallon of this mixture as a neutralizing solution. Temperature should be between 180° and 212° F. (83° to 100° C.). No rinse is necessary following this make up of neutralizing solution as the carryover to the plating solution adds a chemical upkeep which otherwise would have to be made with these same chemicals. Neutralizing may also be done in the first cleaning tank or in a separate tank provided for neutralizing. A rinse must follow neutralizing in the regular cleaner so that the composition of the plating solution remains in chemical balance

*Prepared by the technical staff of E. F. Houghton & Company, Philadelphia, Pa. Parts 1 and 2 were published in our September and October issues.

8. If work is recleaned after pickling, cold or hot rinse as necessary after re-cleaning.

9. Electroplate in acid plating solution.

If stamped work shows not chemically clean after pickling, the neutralizing operation performs two functions—(1) neutralizes pickling acid, (2) produces a chemically clean surface by removing oil which was imbedded in the pores of the metal and was uncovered by the pickle.

8. A hot or cold rinse follows neutralizing solutions not made up of caustic soda or caustic soda and sodium cyanide in accordance with No. 7.

9. Electroplate in alkali plating solution.

Cleaning and Plating Non-Ferrous Metals in Acid or Alkali Plating Solutions

For Acid Plating Solution	For Alkali Plating Solution
1. Inerts and insolubles are removed in a solvent by hand brushing. Sometimes the inerts of buffing compounds are removed in an agitated soap solution (usually whale oil soap). Inerts may also be removed by hand brushing in the platers' cleaner solution. Metals are sometimes hot rinsed after cleaning in a solvent prior to the cleaning in the platers' cleaner solution. This hot rinse removes excess solvent and protects the platers' cleaner from contamination.	
2. Clean all oil, grease and fat to a chemically clean surface, with or without electric current, in solution of proper grade of cleaner.	
3. Either hot or cold rinse, depending on type of cleaner used. (Cleaners containing soap require hot rinse to produce chemically clean surface.) Two rinses, hot followed by cold, are most desirable.	
4. Oxide removal. Light tarnish is removed from non-ferrous metal by a cyanide dip. Heavy tarnish and discoloration is removed from non-ferrous metal by a bright dip.	
5. Cold rinse in an overflowing rinse tank. Rinse for from five to twenty seconds.	
6. If the non-ferrous metal has been cyanide dipped for oxide removal and then rinsed (as in paragraph No. 5) no further operation is necessary prior to electroplating in an acid plating solution. If the metal has been bright dipped for oxide removal, best practice is to rinse (as in paragraph No. 5), then neutralize the bright dip acid in a weak solution of sodium cyanide or potassium cyanide. This operation naturally is followed by another rinse prior to electroplating in an acid plating solution.	6. If work has been cyanide dipped for the removal of oxides, no further operation is necessary prior to electroplating in an alkali plating solution. If work has been bright dipped and then rinsed as in paragraph No. 5, it is necessary to neutralize the bright dip acid prior to electroplating in an alkali plating solution. A weak solution of sodium cyanide or potassium cyanide is used for neutralizing. Rinsing again prior to electroplating is optional.
7. Plate in acid plating solution.	7. Plate in alkali plating solution.

Developments in Nonferrous Metals

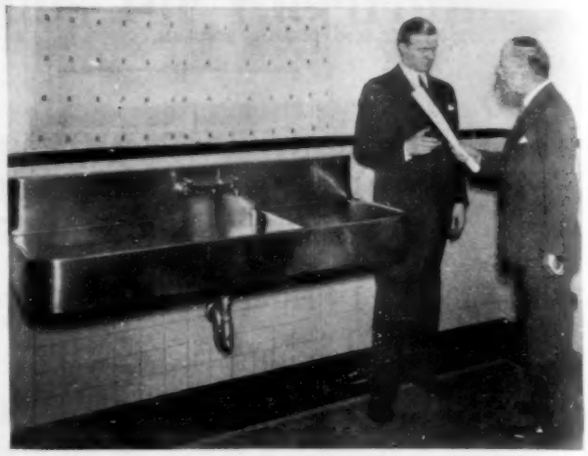
Metal Sink Design Wins

GUSTAVE B. JENSEN is shown in the picture at right receiving from Walter Rendall Story, critic and writer on decorative arts, the Award of Merit from the National Alliance of Art and Industry for the design of a Monel metal kitchen sink. This sink received the greatest number of jury votes in the Design and Industry Exhibition, Household Appliances Class, of the National Alliance of Art and Industry held recently at the Art Center Galleries in New York City. As well as receiving the "Award of Merit" in the Household Appliances Class, this sink received a greater number of jury votes than any other object in the exhibition. The sink is of streamline design, constructed in one piece. The metal has a silvery satin finish. The sinks are manufactured by the International Nickel Company, New York.

An award of merit was given to Walter von Nessen of New York for a coffee service he designed for Chase Brass and Copper Company, Waterbury, Conn.

Honorable mention went to Gerth and Gerth for bells designed for the Chase company.

Joseph Sinel was given honorable mention for a metal and leather desk set designed for Star Case Company.



Mr. Jensen Receiving the Award of Merit for Design of the Monel Metal Sink at His Left, from W. R. Story

Chromium-Lined Copper Ware

A TREND toward the return of copper cooking utensils to the American home is noted by leading household economists and reflected in pretentious displays at retail stores throughout, says the October bulletin of the Copper and Brass Research Association. Special attention is paid to the recent introduction of copperware with inside plating of chromium. Chromium lining represents a distinct advance, says the bulletin, as it provides a nontarnishing cooking surface, besides possessing high wearing qualities. The article points out that copper cooking equipment is used in the kitchens of many fine hotels, clubs and ocean liners. Testimonials from many leading chefs show their preference for copper utensils. Mention is made of a complete array of copper utensils put in the kitchen of the White House in Washington by Theodore Roosevelt, which are still in service after 25 years' use.

Rotary Retort Brass Melters

It was reported in the last annual report of the Committee on Industrial Gas Research of the American Gas Association, 420 Lexington Ave., New York, that the development of rotary retort brass melters had been completed except for material that would give long life when made into retorts. It was also stated that the economy and general satisfaction of this method of melting had been proven during development tests and verified in the field under severe operating conditions. The retort materials now available are satisfactory for certain metals but not for continuous operation when melting brass. The situation is now about the same. However, during the year the committee had a further metallurgical study made by Robert G. Guthrie, as a result of which it is believed that the classification of the factors which must be overcome by the material which finally proves suitable has been made much clearer than heretofore. This study has been made available to a number of concerns that believe they can produce retorts with the desired long life.

Courtesy, Copper and Brass Research Association

A display of Chromium-Lined Copper Utensils Recently Exhibited by Rome Manufacturing Company, Rome, N. Y., at a Houseware Show in New York. The Rome Company Is a Division of Revere Copper and Brass, Inc.

Henry Ford's Appeal to Industry

IN the presidential campaign of 1928, business publications, under the leadership of the late Col. E. A. Simmons, publisher of Railway Age, rallied to the support of Herbert Hoover, believing that he was such on outstanding candidate of industry that he should be upheld by the industrial press. Such action by the business publications was most unusual as they do not consider political affairs unless Government policies affect business.

As President Hoover this year is a candidate for re-election, a number of Industrial Generals have come forth with statements saying why they believe that the welfare of the country requires the re-election of the president. One of these Generals of Industry, who has stated convincing facts, is Henry Ford, the automobile manufacturer. His Detroit speech of October 19th, is of such importance that we herewith reprint it in part.

"It is unusual for me to talk politics. I suppose I am like most Americans; we never bother about politics until it means something to us. Party politics never meant anything to me, and it means nothing to me tonight.

"I support the best man for the job. If Herbert Hoover were a Democrat, with his record during the last four years, I should support him. So you see, I cannot make much of a party speech tonight. Of course, Herbert Hoover's worst enemy would not wish his administration to fall in these times. It is curious how providence turns all things around.

"I supported Woodrow Wilson because I expected that he would devote himself to the improvement of the economical machinery of this country. He understood what was wrong with our money system and wanted to change it. That was his program, but the sudden change of events compelled him to switch all his energies toward war and international problems.

It was the same with Mr. Hoover. When he was elected he expected to organize the machinery of prosperity, but the sudden turn of events placed upon his shoulders the most terrible depression the world has ever known.

"Woodrow Wilson was allowed to go ahead and carry out his program. And for the very same reason Herbert Hoover should be allowed to carry out his program, and I think he will. He has faced the enemy for four years now. He knows all the technique of the forces of destruction. Why bring in a new recruit and retard the seasoned leader, especially since President Hoover already has got the massive forces of defense and recovery into action?

No Pretense of Miracles

"I have great sympathy for Mr. Hoover. I know the size of the job he has been carrying; but he is not asking for sympathy. He is asking for help to complete his job, and I believe he is going to get it. I am not saying that Herbert Hoover can work miracles. I have known a number of Presidents, and I have never yet known one who could. Mr. Hoover is carrying a greater burden than Abraham Lincoln carried. He is carrying it in a way that places him beside Lincoln in sacrificial service. The American people are conservative. They do not run after any new-fangled remedy, and when they do attempt to do anything radical, they want to see it controlled by experience and common sense. Herbert Hoover is the very embodiment of common sense and reliability.

"There are no people in this country who know more about the depression than the automobile workers. We have felt the full force of it. I think the men engaged in the automobile industry are as intelligent as any class in the country. We automobile workers say this: Herbert Hoover cannot work miracles, but he had the opportunity to make some colossal and disastrous mistakes. He was clutched from every side to do panic-stricken things, but he kept his head when others lost theirs.

Never Swayed by Politics

"No act of his has been dictated by panic or politics, and the result is we are now beginning to feel the lifting power of this well-thought-out program. Every act of the President has been in the interest of unemployment. That is what we are saying.

"We have a Congress which comes from the people and represents the people. It usually acts for the best interests of the people. It will be necessary for the President and Congress to work together during the next four years. For that reason we need good men everywhere in office. We should not forget to elect a good Congress in our effort to elect a good President."

President Hoover's Ten Points of Business Recovery

President Hoover in his speech at Detroit, Mich., October 22nd, listed the following ten points of business recovery.

1. More than $300,000,000 of gold has flowed into our country through restored confidence abroad.
2. Currency to the amount of $250,000,000 has been returned from hoarding through restoration of confidence at home.
3. The values of bonds have increased by 20 per cent, thus safeguarding every depositor in a savings bank and every policyholder in insurance companies.
4. Manufacturing production has increased by 10 per cent. Some groups, such as textiles, have increased over 50 per cent in activity.
5. Contrary to the usual seasonal trend, building contracts have steadily increased.
6. The Department of Commerce shows that over 180,000 workers returned to the manufacturing industry in August, 360,000 more in September, and there is evidence of even a still larger number in October.
7. Carloadings have increased from 490,000 per week to 650,000 per week, showing the increased volume of materials moving.
8. Exports and imports have increased nearly 23 per cent.
9. Agricultural prices, always the last to move, have improved from their low points, although they are still hideously low.
10. Bank failures have almost ceased, credit has begun to expand. Every week some improvement is recorded somewhere.

EDITORIALS

Electroplating Research

We commend to the attention of our readers the leading article in this issue (page 427). It is a simple, blunt statement of the fact that fundamental research in electroplating is in danger of being stopped because of lack of funds.

For several years the National Bureau of Standards has conducted researches on electroplating and has published numerous valuable papers on its work. For the past four years, the American Electroplaters' Society has maintained a research associate at the Bureau, who has worked on spotting out, throwing power and porosity in chromium deposition. The program for the next few years includes an extensive study of the protective value of electroplated coatings and the methods of testing and specifying such coatings. At the present time about 7,000 samples are being plated at the Bureau with various metals and combinations, these samples to be exposed later in different parts of the country and to be inspected at regular intervals. Other samples will be subjected to laboratory tests. This work is to lead directly to the development of standards for electroplated metal coatings and it is this work which is in danger of cessation.

The American Electroplaters' Society has appealed for help and they should get it. The total sum required is only $4,000 per year. There are enough manufacturers and supply houses vitally interested in this research, to make up the total without difficulty, if they subscribe only the maximum requested, $25 each.

It is a fact that in the past, manufacturing companies have borne their share of the expense. During the past six years about $22,500 have been subscribed. Manufacturing companies have contributed over $13,000, supply companies about $4,800 and the American Electroplaters' Society membership almost $4,500.

The small sums involved must be raised. The work must not be allowed to stop.

The Time to Modernize Equipment

Business has continued to improve—slowly it is true—but nevertheless steadily. Index numbers have risen with only one or two reversals since the low point in August. The problem then presents itself with more and more force to every manufacturer, to go over his equipment and plant layout with a high powered microscope. How many of the machines are over ten years old? How many machines under ten years of age have been made obsolete by new equipment which performs operations at a much lower cost than the old? Can your present equipment turn out goods at a price to compete with the best equipped plant in the industry? If not, you will have to take work at a loss in meeting competitive prices, or lose the business altogether.

Every intelligent manufacturer knows that sooner or later a plant which has been allowed to run down, (forgivably, perhaps, under unusual circumstances) must be brought back to pitch or the company dies. The question is—when? We quote from a letter from G. H. Clamer, one of our most prominent non-ferrous metal manufacturers, which speaks for itself.

"Now is the time to improve business through increased sale of capital goods—machinery and equipment. In many lines equipment has been so improved during the last five-year period that upon the basis of present prices the equipment will, if operating on a normal schedule, be quickly paid for in savings effected. I can best illustrate this fact by an example I heard recently. A certain railroad had recently purchased some new locomotives. These locomotives are so efficient as compared with the equipment previously used in the same service that two of these locomotives replaced five formerly used for doing the same job. The saving effected by the use of the new locomotives was such that they could be amortized out of the saving effected in one year's time."

The Ups and Downs of Silver

In wondering about the progress and prospects of an industry in which we are vitally interested, we sometimes lose our perspective and forget that it is only one of a large population, all living under similar conditions, and subject to the same influences. For that reason, the simple statement recently made by C. W. Handy to the effect that silver, like all other commodities, is subject to the law of supply and demand, has a salutary effect upon our thinking in the present emergency.

It seems that one speculative factor which has affected the market has been the hope that some action would be taken, beneficial to silver, by individual governments or by international agreement. As we all know, these projects are still in abeyance and their outcome doubtful.

Silver comes almost entirely from two sources, newly-mined metal and bullion from demonetized or debased coinage. The newly-mined metal has greatly decreased in annual output since 1929 (from 260,000,000 ounces to 155,000,000 ounces). Silver reclaimed from coinage has also decreased. The silver flows into three main streams: (1) the arts and industries, (2) fresh coinage and (3) the Far East (China and India). The tendency in the past year or two has been to increase the consumption for coinage, especially among the smaller nations including Mexico, Cuba, Jugoslavia, Belgium and Turkey, but Germany has also bought large quantities of silver.

Silver consumption in the arts and industries has, naturally enough, shown a decline, but this channel, (25,000,000 ounces in the United States and Canada in 1932, and 30,000,000 in 1931), is not nearly so large as the third consumer, the Far East.

The last named market has shrunk to an extraordinary extent, for one reason only, the simple fact that the commodities with which China and India buy silver—their raw products—have fallen in price so sharply.

It is encouraging to hear that authorities do not predict the further collapse of silver. According to Mr. Handy it will probably fluctuate for some time between 26 cents and 30 cents an ounce. Fundamentally, however, its progress, like that of every other material or product, depends upon improvement in economic conditions both in the United States and abroad.

Depression Prices and Returns

A letter, recently published in our contemporary, Mining and Metallurgy, presents a very short but significant tabulation of the comparative prices, consumption and returns (by percentages of the high points) of some of the basic metals produced in the United States. This table reads as follows:

	Price %	Consumption %	Returns %
Nickel	100	54	54
Iron	87	58	50
Steel	85	58	49
Lead	62	75	46
Zinc	56	71	40
Tin	54	75	40
Copper	45	65	29

Mr. Hood closes his letter with the statement, "Had the price of copper been held it would probably have done as well as nickel."

Possibly. It is our own feeling also, that just as much copper would have been consumed at a higher price as was consumed at prices running down to 5 cents a pound. To speak of holding copper, a competitive metal, at the high price of 18 cents, however, is academic. Only a perfectly controlled commodity like nickel or aluminum can be held at high levels in low times. However, what we should like to know is, if copper had been set at a more reasonable figure, let us say, 12 cents or even 14 cents, which would have afforded good profit to producers with good operating costs, still without inviting the participation of vast numbers of marginal producers and small, high cost properties, would not copper have been able to maintain its price? The consumption would have been maintained, as nothing was bought at any price during the past two years which was not absolutely necessary.

What are the copper producers' plans for the future?

Metals in Machine Tools

Man is a tool-making animal; it is through his ability to make and use tools that he has brought himself out of the cave.

In our present age, the highest development of the tool is the power-driven automatic machine tool for cutting, shaping, bending or removing metals. Some of the standard types of these tools are lathes, planers, shapers, milling machines, tools and grinders. In the development of these tools, non-ferrous metals have played no small part.

According to D. M. Gurney, a large turret lathe, for example, uses, in addition to several kinds of alloy steels, 2 brasses, 4 bronzes, copper, lead and babbitt. Worm gears and special feed nuts are made of aluminum bronze (89 copper, 10 aluminum, 1 iron). Similar parts can be made of 88 copper, 10 tin, 2 zinc, where the service is less severe. Bearing bronzes may be 68 copper, 30 lead, 2 tin (which has replaced babbitt in numerous places) or a harder bearing, phosphor bronze (80 copper, 10 tin, 10 lead). Miscellaneous brass castings are used throughout, such as 65 copper, 4 lead, 30 zinc, or 85 copper, 5 tin, 5 lead, 5 zinc.

Purchasers of materials to be used in machine tools have learned the wisdom of buying metals with the view toward ultimate saving rather than the first cost per pound. Machine tools are not a new field, nor are the uses for non-ferrous metals therein, exciting or romantic. Machine tools are, however, a large and steady metal consumer, with the trend toward improvement in quality and longer life. Why should they not increase their consumption of the higher grade materials?

Canadian Tariff

We print on page 454 of this issue, a schedule of the new tariff rates in Canada, on metals and metal products. Many of our readers will recognize items on this list in which they are vitally interested. According to repeated assurances abroad, these rates were not instituted as a blow or "reprisal" against America, but only to encourage reciprocal trade with Great Britain.

The effect upon our trade with Canada may not be definitely known for months to come, and as usual, in matters of this kind, opinions vary with the source from which they emanate. In view of our own policies, we cannot very well object to other nations exercising the right to regulate their own imports, so we must accept the situation if these new rates do our trade with Canada no good.

Fire Hazard in Oily Cloths

Fire hazards often result from oily materials, according to a report issued by the U. S. Department of Agriculture written by C. W. Mowry, on Spontaneous Heating and Ignition in Manufacturing Industries. He reported that 1,500 fires were caused by spontaneous ignition and that more than half of these fires were due to animal or vegetable oils on rags, waste or other substances left or stored under conditions which favor spontaneous heating. F. H. McAuliffe, chief of the Fire Insurance Patrol, pointed out that out of a total of something over 22,000 fires in 1921, almost 5,000 resulted from accumulations of rags and rubbish, and that a substantial number of these were directly traceable to oily rags.

It would be well for every manufacturer to read and follow carefully the following Chicago City Ordinance.

"Oily rags and waste shall be kept during the day in standard waste cans of heavy galvanized iron, having 4-inch legs and self-closing covers, and shall be removed from the building each night."

Long Pull Hopes

We were struck by a release recently sent out by the United Air Lines of Chicago, to the effect that wood is passing from airplane construction. It seems that less than a decade ago, spruce used to be synonymous with airplane building. Today, no part of the most recent airplane is fabricated from wood, as evidenced by the passenger-cargo Hornet-powered mono-metal plane, operated by the United Air Lines and the twin Hornet Boeing bomber recently delivered to the Army Air Corps. Both of these planes were built wholly of metal.

This change has taken place in the short space of ten years. Why not others, in other fields, and with other metals?

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN — W. J. PETTIS
W. J. REARDON — P. W. BLAIR

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE — A. K. GRAHAM, Ph.D.
G. B. HOGABOOM — WALTER FRAINE

Cadmium in Bronze Solution

Q.—Would like very much to get some information on a bronze solution. I have been advised to use cadmium salts in a cyanide copper solution, but don't wish to do so without being sure.

A.—Cadmium may be added to a cyanide copper solution to produce a bronze color, but it requires closer control than the regular bronze solution where copper and zinc are used.

As you have had very little practical experience at plating, we would not advise you to use the cadmium salts with the copper solution to produce a bronze color.

O. J. S., Problem 5,139.

Cadmium Plating

Q.—Our plating department has been experimenting with cadmium plating. The finishes we are getting are very high class. We find, however, that after standing a day or so the finish gets a white bloom on it. This bloom can be easily wiped off. It does, however, spoil the appearance of the surface of the metal. Our process is to first ball burnish the parts, plate, and then ball burnish again.

A.—Cadmium deposits will oxidize or tarnish lightly, and to prevent this the work should be lacquered. A special grade of lacquer is necessary, and if your lacquer manufacturer cannot supply you, kindly advise us and we will tell you where you can purchase it. O. J. S., Problem 5,140.

Coloring Metals

Q.—We are making a metal ring for outside use. This ring is rolled from sheet metal and is to be finished in colors such as black, blue and red, and in some cases left unfinished.

Our problem is to determine whether a zinc ring or an aluminum ring will resist tarnish and corrosion for the longest time when unfinished, and, if possible, how long. Likewise, we have found it impossible to make colors such as blue and red hold firmly to a zinc ring, and we would be pleased to know the cause of this as we are told that there is some reaction which takes place where zinc is covered. We are at the present time using a primer and finished coat of oil base synthetic enamel.

Could you furnish us with a good method to produce such a finish as now used in the automobile industry?

Q.—Both aluminum and zinc will tarnish when exposed to the atmosphere. Aluminum will corrode faster than zinc unless it is specially treated by what is known as the anodic method. With this method the aluminum is made the anode in a sulphuric acid or dilute chromic acid solution, which produces an oxide upon the surface of the aluminum. This method is recommended where lacquers or enamels are to be applied as an exceptionally good adhesion of the enamel is obtained upon this oxide surface.

If your synthetic primer and enamel will not hold on the zinc surface when properly applied, we are sure that the cellulose enamel will not do so either. We are inclined to believe that you will obtain satisfactory results if you make the rings from

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all blanks if possible.

Date .....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.: .....**Cathode surface, sq. ft.:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:** .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary.

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

aluminum and use the anodic treatment method. You will also be able to produce different colors directly upon the oxide surface of the aluminum, which will give you good results against corrosion.

If you are interested in this process write to the Aluminum Colors, Inc., 537 East Washington Street, Indianapolis, Ind., for full particulars.

O. J. S., Problem 5,141.

Etching Steel

Q.—We are interested in a solution for marking steel, similar to that used in putting the name of the manufacturer on razor blades. Any information will be appreciated.

A.—Either of the following solutions are used for etching steel:

1. Nitric acid ..... 32 oz.
   Muriatic acid ..... 3 oz.
   Denatured alcohol ..... 16 oz.
   Water ..... 96 oz.

2. Nitric acid one part
   Water 4 to 8 parts

O. J. S., Problem 5,142.

Nickel Analysis

Q.—We are mailing you a bottle of nickel solution and some pieces of nickel that have crumbled from our nickel anodes. If anything that we are doing would cause these anodes to do this, please let us know.

A.—Analysis of Nickel solution:

Metallic nickel	2.06 oz.
Chlorides	1.35 oz.
pH	6.2

The solution is in a poor condition. The metal and chloride contents are too low and the pH is too high. We would suggest that you add to each 100 gallons of solution 25 lbs. of single nickel salts, 5 lbs. sodium chloride (common table salt), 2½ fluid oz. of sulphuric acid, and one quart of hydrogen peroxide.

The condition of the solution is not the cause of the unfavorable condition of the anodes. The anodes are of a poor grade and we would suggest that you put them in muslin bags to prevent the small particles from entering the solution.

O. J. S., Problem 5,143.

Nickel Solutions and Tanks

Q.—I have a 20 gal. tank for cold nickel solution, but want to make a larger tank. Can I use the solution I now have and add enough new solution to fill the tank, or must I have all new solution? Will a tank made of wood lined with asphalt be satisfactory for cold nickel solution? Also, for copper cyanide solution? Will a tank made of wood lined with lead be satisfactory for chromium solution?

A.—You may use your old nickel solution for a part of the new solution you intend to install. A wood tank lined with asphalt can be used as a nickel tank. If the cyanide copper solution is to be operated cold, an asphaltum lined wood tank may be used. If operated hot, use an iron or unlined wood tank. A wood tank, lead lined, can be used for a chromium solution, but it is not recommended. An iron tank, lead lined, will give better results. O. J. S., Problem 5,144.

Protecting Nickel Plate

Q.—Kindly advise what is the best form of coating to put on polished nickel plated brass of a high finish which at times has to stand some months before use. The pieces are too large and complicated to be closely wrappd.

A.—To prevent the nickel plate work from tarnishing, we would suggest that you apply a very thin coating of a thin oil. Paraffine oil is a good one to use for this purpose, as when the work is wanted for use a light cleaning with a soft cloth will remove the excess oil.

O. J. S., Problem 5,145.

Bright Dip for Bronze

Q.—We are planning to use a bright dip for cleaning the annealing stains from 90/10 bronze wire which is in coil form and No. 10 B & S size. After dipping, we intend cleansing with city water and then using some kind of a dip to counteract the acid carryover and to form a protecting film. I would appreciate very much your advice on what kind of a final dip we should use.

The bright dip is made up of 20% water, 20% nitric acid, 40% sulphuric acid and ½% hydrochloric acid.

A.—We would suggest that the following procedure be used for your work. Use a 15% solution of sulfuric acid and water to remove the fire scale. This pickle should be used hot.

After the removal of the fire scale, use the bright dip made in the proportion that you have given, and rinse in clean cold water, or better, use a spray to completely remove any acid that may be left on the work. If the spray is not used, it will be necessary to use two or three separate rinses with water to remove all traces of the acid from the bright dip. Then rinse in clean boiling water, and, if necessary, use a hot air blast to completely dry the work.

The use of an alkaline material to neutralize the acid from the bright dip is not to be recommended, as any traces of the alkali that is left upon the work will have a tendency to produce a tarnished effect after the work is dried. It would be harder to remove the alkali from the work than the acid.

O. J. S., Problem 5,146.

Quality Standards for Gold Plate

Q.—We are very anxious to obtain information regarding the depositing of gold up to definite standards of quality, and we would like to know if you could possibly help us in this matter.

A.—Manufacturers of gold plated work have no set standards whereby the amount of gold that is deposited must conform to a certain thickness; nor do they usually guarantee that the deposit will last any definite time.

It is the usual procedure to plate the deposit as heavily as the cost of the article will permit. All manufacturers who have any reputation to maintain can be relied upon to plate their work with a deposit that, with fair usage, will give entire satisfaction to the purchaser of their goods. O. J. S., Problem 5,147.

Removing Zinc from Nickel Solution

Q.—We have nickel plated in error a casting which contained a large amount of zinc. This casting, it seems, has left a deposit of zinc in the nickel solution, and now everything which we nickel plate peels. What would you advise to neutralize the zinc in the nickel solution?

A.—Zinc may be removed from a nickel solution by adjusting the pH to 6.2—6.4 and then adding carbonate of nickel to precipitate the zinc. After the zinc has been precipitated the solution should be filtered and the pH adjusted to 5.8 before using.

We doubt if you have gotten the zinc into the solution by plating a casting that contains a large per cent of zinc. Send us a sample of the solution for analysis and we will make a report to you.

O. J. S., Problem 5,148.

Rustproofing Tire Wire

Q.—In the manufacture of wire for automobile tires, it has been our practice to give this wire a light copper dip. This, we understand, is to create a bond between the rubber and the steel. However, we find the wire rusts quickly in service, and it is now proposed to cover the wire with a material that will prevent this rust. We were considering cold galvanizing on which we must also put a copper coating.

We were considering hot galvanizing, but as the wire is of a very high tensile strength, subject to many torsions, we were afraid we might lose some of the specifications in the hot galvanizing process.

A.—We would suggest that the wire be either zinc or cadmium electroplated to prevent it from rusting.

Cadmium plating is somwhat more expensive than zinc plating, but the deposit of cadmium can be considerably lighter than the zinc deposit and still give equal resistance to corrosion.

O. J. S., Problem 5,149.

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,868,646. July 26, 1932. **Foundry Facing.** Benjamin F. Wallace, Brooklyn, N. Y. Filed Aug. 13, 1929, Serial No. 385,693. Renewed Jan. 16, 1932.

1,868,679. July 26, 1932. **Alloy.** Richard A. Wilkins, Rome, N. Y., assignor to Revere Copper and Brass Incorporated, Rome, N. Y.

1,868,898. July 26, 1932. **Alloy.** Charles F. Hammond, New Haven, Conn., assignor to Winchester Repeating Arms Company, New Haven, Conn.

1,869,041. July 26, 1932. **Coated Aluminum.** Helmer Bengston, Indianapolis, Ind., assignor, by mesne assignments, to Aluminum Colors Incorporated, Indianapolis, Ind.

1,869,042. July 26, 1932. **Process of Coating Aluminum.** Helmer Bengston, Indianapolis, Ltd., assignor, by mesne assignments, to Aluminum Colors Incorporated, Indianapolis, Ind.

1,869,058. July 26, 1932. **Anodic Coating of Aluminum.** Charles Hugh Roberts Gower, London, England, assignor to Aluminum Colors Incorporated, Indianapolis, Ind.

1,869,121. July 26, 1932. **Method and Material for Coating Metal Surfaces.** John S. Thompson and Robert R. Tanner, Detroit, Mich., assignors to Parker Rust-Proof Company, Detroit, Mich.

18,552. (Re-issue) August 2, 1932. **Aluminum Alloy.** Cyril S. Taylor, New Kensington, and Junius D. Edwards, Oakmont, Pa., assignors to Aluminum Company of America, Pittsburgh, Pa.

1,869,495. August 2, 1932. **Process of Treating Molten Metals and Alloys with Compositions Containing Lithium and Products Resulting from Such Treatments.** Hans Osborg, Frankfort-on-the-Main, Germany.

1869,496. August 2, 1932. **Art of Treating Metals.** Hans Osborg, Frankfort-on-the-Main, Germany.

1,869,497. August 2, 1932. **Process of Treating Molten Ferrous Metals and Alloys with Compositions Containing "Lithium Alkali" Alloys and Products Resulting from such Treatments.** Hans Osborg, Frankfort-on-the-Main, Germany.

1,869,498. August 2, 1932. **Process of Treating Molten Copper and Copper Alloys with Compositions Containing "Lithium-Alkali" Alloys and Products Resulting from such Treatments.** Hans Osborg, Frankfort-on-the-Main, Germany.

1,869,499. August 2, 1932. **Process of Treating Molten Nickel and Nickel Alloys with Compositions Containing "Lithium-Alkali" Alloys and Products Resulting from such Treatments.** Hans Osborg, Frankfort-on-the-Main, Germany.

1,869,378. August 2, 1932. **Britannia Metal or Pewter Alloy.** Joseph H. Konigsberg, Brooklyn, N. Y., assignor to Standard Rolling Mills, Inc., Brooklyn, N. Y.

1,869,554. August 2, 1932. **Alloy.** Owen W. Ellis, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania.

1,869,784. August 2, 1932. **Process of Metal Coating.** Harry W. Theiss, Louisville, Ohio.

1,869,818. August 2, 1932. **Cushion for Molding Machines.** Wilfred Lewis, Haverford, Pa., assignor to The Tabor Manufacturing Company, Philadelphia, Pa.

1,869,844. August 2, 1932. **Recovery of Metal from Coated Metal Foils.** Ralph B. Derr, Oakmont, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,869,865. August 2, 1932. **Jarring Rollover, Pattern Drawing Molding Machine.** John T. Ramsden, Philadelphia, Pa., assignor to The Tabor Manufacturing Company, Philadelphia, Pa.

1,869,886. August 2, 1932. **Recovery of Metal from Coated Metal Foils.** Ralph B. Derr, Oakmont, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,869,979. August 2, 1932. **Art of Treating Metals.** Hans Osborg, Frankfort-on-the-Main, Germany.

1,869,980. August 2, 1932. **Process of Treating Molten Metals and Alloys with Compositions Containing Lithium and Products Resulting from such Treatment.** Hans Osborg, Frankfort-on-the-Main, Germany.

1,869,996. August 2, 1932. **Controlling Grain Growth in Aluminum-Manganese Alloys.** Theodore W. Bossert, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,870,081. August 2, 1932. **Process and Product for Covering a Metallic Article with an Unworkable Alloy.** William J. Wrighton, Southbridge, Mass., assignor to American Optical Company, Southbridge, Mass., a Voluntary Association of Massachusetts.

1,870,311. August 9, 1932. **Cleanser for Aluminum.** Wilmer Charles Gangloff, Cincinnati, Ohio, assignor to The Drackett Chemical Company, Cincinnati, Ohio.

1,870,388. August 9, 1932. **Process for Refining Bismuth.** Walter C. Smith, Maplewood, N. J., assignor to Cerro de Pasco Copper Corporation, New York.

1,870,470. August 9, 1932. **Concentration of Bismuth Alloy.** Walter C. Smith, Maplewood, N. J., assignor to Cerro de Pasco Copper Corporation, New York, N. Y., a Corporation of New York. Filed June 4, 1930. Serial No. 459,180. 5 Claims. (Cl. 75—17.)

1,870,732. August 9, 1932. **Anticorrosive Aluminum Light Alloy.** Ityro Iytaka, Sugamo-Machi, Kitatoshima-Gun, Tokyo, Japan, assignor to Mitsubishi Zosen Kabushiki Kaisha, Tokyo, Japan.

1,870,743. August 9, 1932. **Means for Electroplating.** Robert J. Piersol, Pittsburgh, Pa., assignor to United States Chromium Corporation, Pittsburgh, Pa.

1,870,958. August 9, 1932. **Apparatus for Metal Plating.** Kenneth C. Monroe, Bridgeport, Conn., assignor to Bridgeport Brass Company, Bridgeport, Conn.

1,871,315. August 9, 1932. **Casting Readily Oxidizable Metals.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

1,871,316. August 9, 1932. **Purifying Light Metal.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

1,871,450. August 16, 1932. **Metallic Powder and Method of Making.** John A. Gann, Midland, Mich., assignor to the Dow Chemical Company, Midland, Mich.

1,871,494. August 16, 1932. **Grinding and Polishing Machine.** Gustave A. Carlson, assignor to Acme Manufacturing Company, Detroit, Mich.

1,871,770. August 16, 1932. **Method of Depositing on Chromium.** Blasius Bart, East Orange, N. J., assignor to The Frink Corporation, Long Island City, N. Y.

1,872,085. August 16, 1932. **Die Casting Machine.** Torbjorn C. Korsmo, Madison, Wis., assignor to Madison-Kipp Corporation, Madison, Wis.

1,872,091. August 16, 1932. **Process of Cleaning Metal.** Harry C. Mougey, Detroit, Mich., assignor to General Motors Research Corporation, Detroit, Mich.

1,872,280. August 16, 1932. **Alloy.** George P. Halliwell, Wilkinsburg, Pa., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania.

1,872,611. August 16, 1932. **Process of Making Potassium Metal or Sodium-Potassium Metal Alloy.** Richard Thurm, Saginaw, Mich., assignor to Baker Perkins Company, Inc., Saginaw, Mich.

1,872,614. August 16, 1932. **Coating for Ferrous Metals.** Ralph J. Wirshing and Henry R. Faas, Detroit, Mich., assignors to General Motors Research Corporation, Detroit, Mich.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Rolled Zinc and Zinc Die Casting Information

The New Jersey Zinc Company, 160 Front Street, New York, has just issued two technical bulletins of interest to all users and finishers of rolled zinc and zinc die castings.

The booklet on "Horse Head" zinc die castings gives a considerable amount of metallurgical and engineering data, with many illustrations, graphic charts, tables, etc. Also included is a card on which are given the original properties of die cast "Zamak" alloys, for ready reference. This covers all physical characteristics and properties, electrical and chemical data, and complete metallurgical information. The booklet describes in detail the manufacture and use of zinc die castings, with charts showing effect of aging treatments on strength, dimensions and other properties. Applications are fully covered, with many pictures as well as written descriptions. The booklet also takes up the matters of soldering, welding, use of inserts, finishing, machining, and a variety of other data regarding the product.

The other booklet, "The Lacquering and Enameling of Rolled Zinc and Zinc Die Castings," gives complete information on these subjects. All aspects of cleaning are treated, and also mechanical and chemical roughening of surface, and the finishing. In fact, preparation of the zinc or die cast metal for finishing is given the most attention, since the actual final finishing with enamel or lacquer does not differ greatly from common practice in other metals. However, there is a good section on baking of finishes, due to the fact that zinc has a low melting temperature.

Both of these bulletins are available to readers, who should address the company directly for them.

Oxidation Rustproofing Process

Metal Oxidation Corporation, 225 Fifth Avenue, New York, announces that a new method of rustproofing iron and steel is now available. It is said to have the further advantage of putting an attractive finish on the product at the same time.

The process employs a chemical compound sold by the company. This is used in solution, at 130° C., and 2 to 10 minutes' immersion is required. The finish produced is black, and the length of immersion period is dependent upon the intensity of blackening desired. According to the company, the finish is an oxidation, "integral" with the base metal, which will not rub or chip off, and does not affect micrometer tolerances in size, threads, or otherwise change the work. Luster of finished work depends upon the finish it has before treatment in the chemical bath, and it is claimed that the rustproofing will not alter a high polish or a dull, satin finish if such finish is put on the work previous to treating.

Temperature Regulators

Sarco Company, Inc., 183 Madison Avenue, New York, manufactures a line of temperature regulators for various industrial applications, such as in regulation of the heating of solution tanks for cleaning or

Sarco Regulator.

plating, dry kilns, ovens, drying rooms, etc.

The company offers the type TR.21 for control of tank temperatures ranging from 30° to 300° F. The regulator consists of a thermostatic device which keeps temperatures constant. This type is inserted into the tank in such a manner that the thermostat is subjected to the temperature of the solution. Another type, TR.22, can be entirely immersed in a solution.

Sarco also affers a service of supplying special temperature regulating equipment for special applications to which standard products are not adaptable.

Oil Remover for Metals

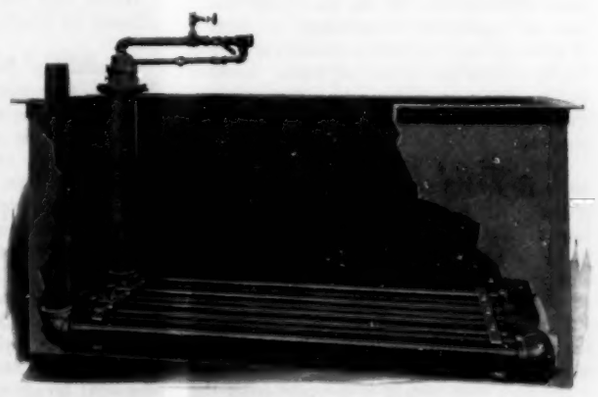
Me-Terj-Ol, a highly concentrated cleaning agent for oily metals, is offered by Me-Terj-Ol Products, Inc., Empire State Building, New York. The cleaner is also useful for removing oily deposits from tanks, drums, floors, pipe lines and other places, it is stated. According to the maker the cleaner is instantly soluble and miscible in water, and that maximum detergency is reached at 125° F. It can be used in salt water. It is claimed that it will go the full length of steam flow in a vaporizing system. No burn will result from contact with the skin, it is claimed. Other advantages mentioned are: high available alkali content; liquid form makes for very rapid dissolving; small amount required for new solution and low upkeep requirement; long life. It is also stated that the product, a liquid, contains no more water than powders made for similar use.

Gas Fired Immersion Heaters

Steam and Combustion Company, Inc., 1559 Sheffield Avenue, Chicago, Ill., offers a new product, the "SteCom" immersion heater for heating metal cleaning and certain other solutions. The heater is gas fired.

According to the manufacturer, these heaters are made in two standard constructions—a two-valve type and a one-valve or proportional mixer type. Both operate on a common principle. The equipment is essentially a gas burner firing into a submerged refractory lined combustion chamber extended into a pipe coil, also submerged. Both elements supply the necessary surface for transfer of heat from the gas combustion to the medium to be heated. The equipment is stated to operate successfully on all gases —natural, manufactured, mixtures of these, and butane.

The heaters are applicable to heating soda metal cleaning solutions; oils; melting lead. While they cannot be used directly in zinc baths for galvanizing, due to the tendency of zinc to alloy with the iron equipment, a method has been developed whereby a zinc bath or kettle is carried in a lead bath which maintains the zinc at proper galvanizing temperature. It is said to increase spelter kettle life, and to effect considerable fuel economy.



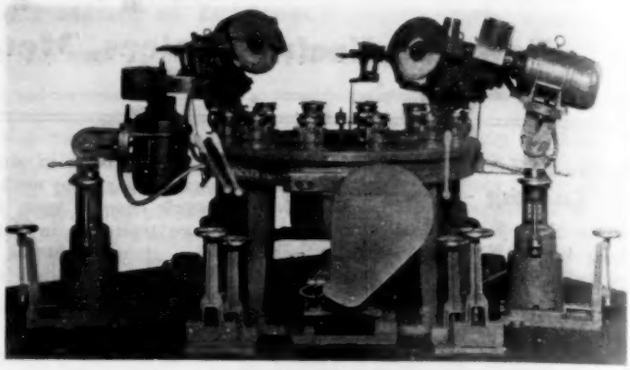
New Type Immersion Heater.

New 12-Spindle Automatic Polisher and Buffer

The Packer Machine Company of Meriden, Conn., formerly The C. I. Packer Tool and Die Company, has added another size of automatic buffing and polishing machine to their line. This machine can be furnished with four or five wheel heads. Each wheel is driven by a ball bearing, totally enclosed, dust-proof motor. Three, five and seven and one-half horsepower motors can be used on these heads. Universal wheel adjustment permits wheel to be set to any degree from horizontal to vertical also swivel to any required position. The wheel head pedestal is adjusted longitudinally by means of a screw in the floor base.

Twelve inches is maximum diameter of work handled by this machine. The work table has twelve spindles, each with automatic expansion chuck. To the jaws of the expansion chuck are fastened the adaptors or fixtures for holding the work. The work table rotates with intermittent action and is driven by a four speed motor mounted at the base of the machine. The period of dwell, that is, the length of time the work is in contact with the wheels, may be set to suit the work and required finish. The entire mechanism is driven by gears submerged in a dust-proof oil reservoir. Ample time is provided for the removal of finished work and for re-loading.

Electrical controls consist of switches for each motor and push button for emergency starting and stopping. All controls are centralized in front, allowing full control of the machine and complete production by a single operator. The machine is equipped with mechanical composition feeding devices, controlled by levers at the front of the machine. Sheet metal dust exhaust hoods are furnished over wheels. The machine is completely wired, and at time of installation only one electrical connection is necessary.



New Packer 12-Spindle Polishing and Buffing Machine.

Data on Metal Degreasing by Dow Chemical Company

The Dow Chemical Company, Midland, Mich., has just issued Special Development Bulletin No. 18, on Improved Methods of Industrial Degreasing of Metals. It gives a very complete discussion of this highly important phase of metal working and finishing, leading up to a discussion of the qualifications of Dow solvents for the purpose.

The data are presented in good technical form, and cover these phases: liquid phase degreasing; vapor phase; outline of discussion; tables of solvent comparisons and corrosion tests; sketches of equipment; qualifications of Dow solvents; summary of data.

The book is arranged in convenient form for filing, the cover being a file folder with title tab.

Readers may obtain it directly from the Dow company.

Equipment and Supply Catalogs

Immersion Oil Heaters. Harold E. Trent Company, 618 North 54th Street, Philadelphia, Pa. Leaflet TB-30; electric units.

Nut-Lock. Ohio Equipment Company, Inc., 5716 Euclid Avenue, Cleveland, Ohio. Price list of Cole's automatic nut-lock.

Welding. General Electric Company, Schenectady, N. Y. Bulletin GEA-1546A; electrodes and accessories. Fully illustrated.

Torches. The Linde Air Products Company, New York. Pamphlet on "Prest-O-Lite" equipment for soldering, brazing and heating.

Knife and Saw Grinders. Samuel C. Rogers and Company, 191 Dutton Avenue, Buffalo, N. Y. Price list applying to catalog No. 50-A.

Ingot Metals. H. Kramer and Company, 21st and Loomis Streets, Chicago, Ill. Two pamphlets: Nickel Silver Ingot, and Manganese Bronze Ingots.

Consulting Service. Lucius Pitkin, Inc., 47 Fulton Street, New York. Circular on chemical, metallurgical, engineering, assaying and sampling service.

Bolts, Nuts and Screws. Clark Brothers Bolt Company, Milldale, Conn. Catalog and handbook. Free copies are offered to readers mentioning this journal.

Consulting Service. The Wallace G. Imhoff Company, Vineland, N. J. A list of subjects affecting hot galvanizing, on which this consulting firm specializes.

Pipe Fittings. The Parker Appliance Company, Cleveland, Ohio. Catalog 34, Copper Plumbing with Innerseal Fittings. Very complete, illustrated technical data.

Heat Treatment Furnaces. W. S. Rockwell Company, 50 Church Street, New York. Bulletin 335, Roller Hearth Furnaces, electric and fuel, for continuous heat treatment of metals.

Rolling Grilles and Gates. Cornell Iron Works, Inc., 3610 13th Street, Long Island City, N. Y. Illustrated leaflet on a new and interesting product.

Welding Rod. Linde Air Products Company, 205 East 42nd Street, New York. Oxweld No. 25 M. Bronze patented welding rod. 20 pages, 3½ x 6. Full data on applications, etc.

Brazing Alloys. Handy and Harman, 57 William Street, New York. Bulletins on Sil-Fos, with very good data on the use of this brand of brazing alloy (sometimes called hard solder.)

Lacquer Tests. Hercules Powder Company, Inc., Wilmington, Del. A very comprehensive publication, very well printed and arranged, on tests of lacquers. Complete engineering data are given, and the material is also illustrated.

Hard Rubber. American Hard Rubber Company, 11 Mercer Street, New York City. Catalog 1, of "Ace" hard rubber products for industrial purposes. 20 pages, very well illustrated; has tables of weights and tolerances of various hard rubber products.

Marketing Good Design, by Richard F. Bach, director of industrial relations, Metropolitan Museum of Art, New York. Issued by Metropolitan Life Insurance Company, N. Y., as an Executive Service Bulletin. A highly interesting analysis of the origin and progress of design in the art industries, and the use of museum collections as laboratory material.

Metal Finishing. The Lea Manufacturing Company, Waterbury, Conn. "The Lea Method of Metal Finishing," by R. S. Leather, gives some very good information on use of various Lea compositions for polishing. It outlines in particular some methods of producing butler, satin and colonial finishes by the Lea "dry" method. Sections are devoted to breaking in wheels and elimination of wheel operations.

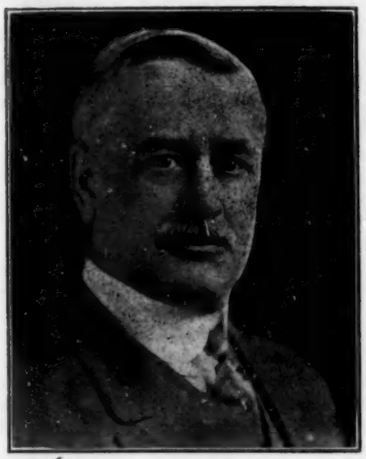
Personals

S. T. Johnston

It will be of interest to his many friends in the foundry industry to learn that Sam T. Johnston, for many years vice-president of the S. Obermayer Company, Chicago, Ill., manufacturers of foundry supplies, retired from active service with that company September 15.

It is announced that Mr. Johnston will continue as president of the Standard Sand and Machine Company, 549 West Washington Boulevard, Chicago.

There is probably no one in the foundry industry in this country who enjoys a wider acquaintance among foundrymen or is more popular in the industry than Sam Johnston. A native of Scotland, he came to this country in 1889. His first connection was with the Detroit Car Wheel Company, of which J. H. Whiting was then superintendent. When Mr. Whiting organized the Detroit Foundry Equipment Company, Mr. Johnston was given a position as salesman. He went with Mr. Whiting when the latter moved to Harvey, Ill., to form the Whiting Foundry Equipment Company, now the Whiting Corporation, and continued with that organization for ten years. He then became connected with the S. Obermayer Company and was with them continuously until the date of his retirement, September 15.



S. T. JOHNSTON

Mr. Johnston early became identified with foundry organizations and in 1896 was elected Secretary of the Western Foundrymen's Association. As an officer of that organization he was one of the signers who called a meeting of foundrymen at Philadelphia in 1896, resulting in the organization of the American Foundrymen's Association, and became a Charter Member of that organization. He has attended every annual convention of the Association.

When the Foundry Supply Association was organized in 1906 he was elected the first president. In 1908 and 1909 he served as vice-president of the American Foundrymen's Association, and when in 1916 the A.F.A. was incorporated, he was one of the signers of the application for a Charter. He became one of the first directors and served continuously for eight years. In 1927 and 1928 he again served as vice-president of the Association and in 1929 as president, distinguishing himself as a leader with the A.F.A. group of delegates attending the third International Foundrymen's Congress held in London, June, 1929.

As president of the A.F.A. he served as chairman of the International Committee of Foundry Technical Associations and presided at their meeting during the London Congress, and has many friends and admirers abroad as well as in this country.

Mr. Johnston also has been closely connected with the development of the Foundry Equipment Manufacturers' Association, serving as its president for the year 1926.

In retiring from active service Mr. Johnston retains his interest in the Obermayer Company, and it is certain that he will retain his interest in the industry and his host of friends therein.

His home address is 175 Addison Road, Riverside, Ill., where he and Mrs. Johnston have lived for more than thirty years. For nine years he was a member and president of the Riverside Board of Education, president for two years of the Riverside Golf Club, and was recently elected president of the Riverside Public Library.

Obituaries

John Stewart Murray

John Stewart Murray, director of purchases of the Aluminum Company of America, Pittsburgh, Pa., died recently at the age of 57, of paralytic stroke.

Mr. Murray was the son of a Pittsburgh lawyer. He entered the employ of the Aluminum company in 1903, as a bookkeeper. After some months at this work he was transferred to the purchasing department as assistant to the then purchasing agent, E. S. Fickes, now senior vice-president. Within several years Mr. Murray was made purchasing agent. As the company grew and purchasing agents were appointed for various plants, the position of purchasing director evolved, and Mr. Murray filled it, controlling the buying activities of the entire company. "The Alcoa News," company journal, says of him:

"Perhaps no one man in our organization has placed such a definite, personal imprint upon our immediate, individual occupations as the sincere, genial gentleman who acted so long as our Director of Purchases. Whether we work with lathes, ladders, or locomotives, paper, pencils or pickaxes, the tools with which we carve our destinies were chosen under the able guidance of John Stewart Murray."

Abraham P. Cobb

Abraham Polhemus Cobb, senior vice-president of the New Jersey Zinc Company, New York, and one of the founders and former president of the American Zinc Institute, died October 6, 1932, after a long illness. He was sixty-eight years old.

Mr. Cobb, who was one of the pioneers in the zinc industry in the United States, was born in Hopewell, N. Y., on April 9, 1864, the son of the late Rev. Oliver Ellsworth Cobb and Mrs. Cornelia Whitney Polhemus Cobb. In his youth the family moved to Flushing, Queens, where Mr. Cobb received his education at Flushing Institute.

In June, 1882, Mr. Cobb entered the New Jersey Zinc Company offices at New York City, as a junior clerk. He remained with that firm throughout his lifetime, having celebrated his fifty years of service last June. In 1894, he was made secretary of the company and in 1912 became a vice-president.

Mr. Cobb also was president of the Palmerton Company, of Palmerton, N. J.; vice-president and director of the Mineral Point Zinc Company, the Empire Zinc Company, the Palmer Land Company and the Palmer Water Company; director of the Tarrytown National Bank, the Bertha Mineral Company, the New Jersey Zinc Sales Company, the Chestnut Ridge Railway Company, the Master Painters' Supply Company, the Palmerton Lighting Company, the Palmerton Telephone Company and the Palmerton Disposal Company. He was also a national councillor of the United States Chamber of Commerce and a member of the Chambers of Commerce of the State of New York and Westchester County.

Edward Kneeland

Edward Kneeland, for many years treasurer of the United Engineering and Foundry Company, Pittsburgh, Pa., died recently. He was associated with the late Isaac W. Frank in the organization of the Frank-Kneeland Machine Company, Pittsburgh, in 1892, and in 1901 assisted in the merger of a number of plants into the present United Engineering Company. Mr. Kneeland had retired from active business in 1923.

Samuel E. Huenerfauth

Samuel E. Huenerfauth, president and treasurer of Crown Rheostat and Supply Company, Chicago, Ill., died suddenly on Friday night, October 28. He was nationally known in the electroplating industry, an important figure in the American Electroplaters' Society, and was univer-

sally liked and respected. (A more extended biography will appear in the next issue.—Ed.)

Frank L. Squires

Frank L. Squires, treasurer of the Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., died recently after a few days' illness.

Mr. Squires was born forty-four years ago in Waterbury, son of Otis A. and Lillian Parsons Squires.

John Henry Schumann

John Henry Schumann, chairman of the board of Hilo Varnish Company, Brooklyn, N. Y., died last month in his fifty-ninth year, after a short illness with pneumonia.

News of Associations

American Electro-Platers' Society

Executive Committee, 1933 Convention, Chicago

F. H. HANLON
General Chairman

C. S. TOMPKINS
General Secretary

All communications regarding the convention should be addressed to the general secretary, at 6916 Clyde Avenue, Apt. 303, Chicago, Ill.

GENERAL HISTORY AND GROWTH OF CHICAGO

Many of our members have seen the rapid growth of plating departments and equipment, both in size and quality. Yes, and on the first night of our Chicago convention, June 27, 1933, as our boat load of happy reunionists skirts the shore of Lake Michigan—the conversation will include much discussion of the history of electroplating. But now it is our purpose to sketch the history and growth of Chicago.

1673

Father Marquette and Louis Joliet were the first white men to record their visit to the site of Chicago.

1683

Robert LaSalle, the famous French explorer was here many times from 1679 to 1683, and in the latter year wrote a brilliant prophecy of our city to a friend in France—

"This is the lowest point on the divide between the two great valleys of the St. Lawrence and the Mississippi. The boundless regions of the west must send their products to the east through this point. This will be the gate of empire. Everything invites to action."

1804

John Kinzie was the first white man to make a permanent home here.

1803-1804

Fort Dearborn was first built during the winter.

1812

Owing to Indian hostility Fort Dearborn was abandoned, with all its occupants leaving for the East. About two miles south of the fort the Indians attacked and massacred most of the whites.

1816

Fort Dearborn was rebuilt and maintained until 1834.

1833

Chicago was incorporated as a town with a population of 550 people.

1837

Chicago was incorporated as a city, the population having increased to over 4,000 people.

1843

Chicago became a full-fledged city when council ordinance forbade hogs and other farm animals from running at large in the streets.

1871

Chicago overcame the disaster of the "Great Fire" when its 324,000 people began to replace the 17,450 buildings with newer and better ones.

1893

Chicago was host to the world for the Columbian Exposition or so-called "World's Fair" when 27,500,000 admissions were registered at its gates from May to November.

1933

Chicago welcomes everyone to see its own Century of Progress Exposition when the second largest city in the United States, through its three and one half million people, asks you to see what one hundred years of our motto "I Will" has accomplished.

The Century of Progress Exposition opens June 1st, 1933, closes Nov. 1st.

The American Electro-Platers' Society Convention June 27-28-29-30, 1933. Headquarters Congress Hotel. Combining two of the greatest opportunities educationally you have ever had. Can you afford to miss it? It's worth your effort and if necessary a sacrifice to attend the 1933 Convention.

HAVE YOU STARTED THAT CONVENTION SAVINGS FUND?
Start planning NOW. We'll see you THEN.

Society for Testing Materials

The formal organization of a new standing committee of the American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa., designated Committee E-2 on Spectrographic Analysis, was completed at a recent meeting, in recognition of the rapid increase in the use of the spectrograph and the necessity of correlating data and eventually standardizing methods of use. H. V. Churchill, Chief Chemist, Aluminum Company of America, who had served as temporary chairman pending formal organization, outlined the role of the spectrograph in industry, as a qualitative and quantitative tool.

The officers of Committee E-2 on Spectrographic Analysis are as follows: Chairman, H. V. Churchill; Vice-chairman, O. S. Duffendack, University of Michigan; Secretary, C. C. Nitchie, Bausch and Lomb.

The Advisory Committee is made up of the above officers and in addition, T. A. Wright, Lucius Pitkin, Inc., New York, and E. E. Schumacher, Bell Telephone Laboratories.

Ornamental Bronze Makers

Four hundred twenty-five manufacturers of ornamental iron, bronze and wire products participated in the development of a set of Trade Practice Rules for their mutual government at a conference of the industry called by the Federal Trade Commission, October 3, at Cambridge Springs, Pa., under the auspices of the Federal Trade Commission.

A committee of five men was elected to receive reports of violations and to transmit them to the Federal Trade Commission, and for this purpose and to insure the utmost secrecy as to identity of the man who makes a report of any concern the Committee engaged O. J. Condon, of 1331 G Street, N. W., Washington, D. C., as permanent secretary to handle the details.

Purchasing Agents Association

An Exhibition of members' products will be held by the Purchasing Agents Association of New York in the Hotel Pennsylvania on Tuesday, November 15th, 1932. More than sixty firms have taken space. The exhibit will be open from 11:00 in the morning until midnight. At seven in the evening the dinner-meeting of the Association will be held at the Pennsylvania.

While the exhibits are restricted to the products of members of the Association, there is included a wide range of manufactured products, machinery and service. The exhibit will be held in conjunction with the November meeting of the association, which will be presided over by Henry Meyer of the General Bronze Corporation, Long Island City, N. Y.

The association has headquarters at 1 Bridge Plaza, Long Island City, N. Y.

Industrial and Financial News

Chase Sees Improvement in Copper and Brass Business

"There has been a distinct improvement in the copper and brass industry for some weeks, and reasonable ground for expectation that this improvement will continue subject to seasonal conditions," said F. S. Chase, president of the Chase Brass and Copper Company, Waterbury, Conn., and vice-president of the Copper and Brass Research Association, at the twelfth annual meeting of that organization last month.

Revere Copper Operates at Capacity at Rome

About 40 office men and women have been transferred from the main office of **Revere Copper and Brass, Inc.,** Bouck Street, Rome, N. Y., to the former office building of the old **Rome Manufacturing Company** on Railroad Street. The entire plant and office building on this site has been renovated, and expectations are high for progressive development in the plant. The manufacture of kitchen utensils will predominate for the time. The plant will continue to operate at capacity until new equipment is received and installed. An effort will be made to resume making the products formerly manufactured in this plant, including tubing and forgings. **James Kennedy,** formerly of Chicago and more recently at the company's office in New York, will be executive head of this unit. It will be operated independently. **C. M. McCreery,** Lake Delta, formerly with the Goodyear Rubber Company, will be sales manager. Mr. Kennedy started operations at the plant on October 24.

E. K. B.

$50,000 in Precious Metal Stolen from Refinery

Gold, platinum and silver valued at $50,000 was stolen from the refining plant of Kastenhuber and Lehrfield, Flushing Avenue, Brooklyn, N. Y., on October 25, by five armed men who entered as a truck was leaving the plant, and held up the whole working force of 10 people. The metal was in bars. The thieves also took $200 in cash, and some firearms.

Metals at British Fair

There will be many new features in an exceptionally large display of stamped metal goods at the 1933 British Industries Fair at Birmingham, England, February 20 to March 3, 1933. The range of products includes water, sanitary, gas and electric fittings and pendants in brass and copper; fancy metal work; pressings and repousse work; hollow-ware of aluminum, iron and steel, japanned, tinned or galvanized; stainless steel; and brass and copper. Special prominence is being given to anodic oxidization of aluminum.

The fair is represented here by Industrial Development Assn., of Great Britain and Ireland, 295 Madison Avenue, New York.

Taxing of Containers of Rouge Protested

Imposition of a federal revenue tax of 10% on compacts and similar containers of rouge and face powder is being actively protested by the jewelry trade in the Attleboro, Mass., and Providence, R. I., districts. It is felt that the tax put on the value of the container merely because the content is a taxable cosmetic is unfair. Ordinarily, jewelry under $3 in value is untaxed, but the Internal Revenue Bureau has ruled that a "compact" is taxable as a cosmetic, disregarding the fact that often the actually taxable content represents only a small part of the value of the whole item, while the container is the main item bought, and is to be regarded as a piece of low-priced jewelry rather than as the "can" or "package" in which the content is sold. The trade is reported willing to carry the matter to court.

Westinghouse Sees Upturn

Evidence is accumulating on every side of improvement in general business conditions, is the belief of executives of Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

Brass Ingot Statisties

Non-Ferrous Ingot Metal Institute, Chicago, Ill., reports average prices per pound received by its membership on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending October 7, as follows, with which we supply comparative prices reported for the period ending September 9:

	Month Ending— Oct. 7	Sept. 9
Commercial 80-10-10 (1% Impurities)	7.125c	6.835c
Commercial 78%	5.507c	5.066c
Commercial 81%	5.750c	5.290c
Commercial 83%	6.021c	5.579c
Commercial 85-5-5-5	6.267c	5.883c
Commercial No. 1 yellow	4.735c	4.402c

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for the month of September, 1932, amounted to 2,112 tons, compared with 1,758 tons in August.

On October 1 unfilled orders for brass and bronze ingots and billets on the books of the members amounted to 18,336 net tons.

Plating Business Better in New York District

The situation in the plating industry in the New York area has taken on a decidedly improved aspect, judging from reports of firms which are representative of the job plating and the finishing supply and equipment business.

Philip Sievering, Inc., New York City, a leading job plater and finisher, last month added about twenty-five men in various departments, and is now operating at very near normal capacity, on work which is mainly in staple lines, rather than "holiday" work. It includes such items as beauty parlor equipment, store fronts and fixtures, machinery parts, building hardware, and barrel plated work.

The firm of Beam-Knodel, Inc., New York City distributors of Hanson-Van Winkle-Munning finishing supplies and equipment, reports a steady gain in business over the past several months, with October showing a considerable increase over preceding months, and business in general at this time of the year greatly improved over a year ago. Mr. Knodel, one of the heads of the firm, stated that, while holiday lines were responsible for some of the gain, perhaps sixty per cent of it was due to the more substantial types of production, rather than seasonal lines.

Metal Products Affected by Tariff Investigation

President Hoover last month requested the Tariff Commission to investigate certain tariff schedules due to currency depreciation in foreign countries, with a view to making changes under the flexible provisions of the present Tariff Act. The ultimate purpose is to increase rates which are found to be too low to afford adequate protection of American workers, and thus effect such unemployment relief as is possible by means of tariff protection of products made here. Nearly all sections of the Act are affected.

Many metal lines are included in a list of industries where employment is said to be unfavorably affected by increased importation of competitive products. The President listed the following among those he is having investigated: cutlery; silverware; jewelry; metal goods; chemical products (which includes some chemicals used in the metal processing industries).

Training for Foundrymen

Extension Division, University of Wisconsin, Madison, Wis., offers home study correspondence courses in certain phases of iron and non-ferrous foundry work. The non-ferrous work is under a course in foundry metallurgy, including standard testing methods. The university has long been teaching industrial and engineering subjects.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

NOVEMBER 1, 1932.

The superior court last month ended the one-month receivership of the **Waterbury Clock Company,** following adoption of the new financing plan explained here last month. New officers were elected by the holders of the new preferred stock, of which **James R. Sheldon** took the majority of shares, in accordance with the terms of the financing plan. The officers are: president and treasurer, **James R. Sheldon;** assistant treasurer, **Carl Kraft. C. H. Granger** was reelected vice-president, and **George H. Close** secretary. The only directors are Mr. Sheldon, Mr. Kraft and **R. W. Van Riper,** who are associated in James R. Sheldon & Co. of New York, and in refinancing the Waterbury company. Mr. Sheldon is a son-in-law of **Irving H. Chase,** former president and treasurer, owner of the largest block of common stock, whose family and associates control a majority of the common stock. Mr. Chase was succeeded as president over a year ago by C. W. Curtis, who died a few months later. Mr. Roper then became president and Mr. Osborne, treasurer. Both are now out of the concern.

James R. Sheldon was elected president of the **Beardsley and Wolcott Manufacturing Company,** to succeed R. W. Reid, resigned. Mr. Sheldon has been vice-president and general manager of the concern. **Francis T. Phillips** has resigned as treasurer but remains as assistant treasurer and director. **R. W. Van Riper** (mentioned above) was elected treasurer. He has been auditor and controller of the Beardsley concern. **Robert S. Booth,** an employe of the old **Berbecker and Rowland Company,** acquired by the Beardsley concern, has been made vice-president in charge of production. **C. N. Turner,** salesman, has been made vice-president in charge of sales. **Carl Kraft** (see above) has been elected assistant treasurer. **Rowley W. Phillips** remains as secretary and director. **T. A. D. Jones** of New Haven and **Theodore Lilley** of the Citizens Coal Company here have been added to the board of directors.

Increased activity is reported at both the **Beardsley and Wolcott Company** and **Scovill Manufacturing Company.** The button department at Scovill's is now working full time, with sufficient orders to keep it busy for several weeks. That company is also producing a cocktail shaker with an attachment containing a formula for a variety of cocktails shown by turning a dial. **International Silver Company** is also busier, turning out Christmas orders.

Waterbury Fastener Corporation has acquired the plant and business of the **Frank J. Quigan Company** of Brooklyn, N. Y., and will reincorporate and merge under the name of the latter company. **John W. Shepard,** general manager of the local plant, denies reports that it will be moved to Brooklyn, but says, on the contrary, business of local plant will be expanded. Both make metal frames and ornaments for ladies' handbags and similar metal trimmings. The local company for some time has been controlled by **United Carr Fastener Corporation,** Boston. There are now about 110 employes at the local plant, and a small shift is working nights.

It is thought some of the local plants may have a share in fabricating the 4,000,000 pounds of copper recently purchased by **Westinghouse Electric Company.** If purchased from Kennecott, Chase Companies would probably have the fabricating; if purchased from Anaconda, the **American Brass Company** probably would get the work.

The largest less-than-carload freight

Canadian Tariff Rises Affect American Products

The United States Department of Commerce made public on October 14, 1932, the final part of its survey of Canadian tariff changes, with comparisons between the old and the new rates. Changes in metals and metal products are as follows:

Commodity	General Rates (Apply to U. S. & Other Non-Treaty Countries). New.	General Rates (Apply to U. S. & Other Non-Treaty Countries). Old.	British Preferential Tariff. New.	British Preferential Tariff. Old.
Lead capsules for bottles	No change	30% ad val.	10% ad val	20% ad val.
Type for printing, including chases, quoins and slugs of all kinds	No change	20%	7½%	12½%
Babbitt metal and type metal in blocks, bars, plates and sheets	20%	15%	No change	10%
Copper in bars or rods when imported by manufacturers of trolley, telegraph and telephone wires, electric wires and electric cables for use in manufacture of such articles	10%	Free	No change	Free
Brass in bars and rods, in coils or otherwise, not less than six feet in length, and brass in strips, sheets or plates, not polished, planished or coated	15%	10%	No change	5%
Wire of all metals and kinds, n. o. p.	35%	20%	10%	15%
Coin locks of which solid brass or bronze are the component materials of chief value, polished or plated or plain	50%	Ranging from 30% to 40%	15%	Ranging from 20% to 30%
Aluminum and alloys thereof, crude or semi-fabricated, viz.: Pigs, ingots, blocks, notch bars, slabs, bars, rods and wires, angles, channels, beams, tees and other rolled or drawn sections and shapes, pipes and tubes, plates, sheets and strips, including circles, leaf or foil less than .005 inch in thickness, plain or embossed, with or without backing wire and cable twisted or stranded reinforced with steel or not; aluminum powder	30%	Free	20%	Free
Manufactures of aluminum, n. o. p.	30%	25%	No change	15%
Gold and silver leaf, Dutch or schlag metal leaf, brocade and bronze powders	30%	27½%	No change	15%
Rollers, copper, adapted for use in calico printing	10%	Free	No change	Free
Electrotyping and stereotyping apparatus	10%	New item	Free	New item
Typewriters and complete parts therefor	No change	25%	Free	10%
Table knives and forks	35%	30%	15%	30%
Jack-knives and pocket knives of all kinds	No change	30%	Free	20%
Knives, n. o. p.	No change	30%	Free	20%
Spoons	No change	30%	15%	20%

(Continued on next page)

tonnage to be put through the local freight depot in any six-day period since 1930 was shipped in the six days ending Sept. 22 and on Sept. 30 the largest number of shipping orders to move over the floors of the depot in any day since that year were put through. On that day the number of orders exceeded the normal day's figure by more than 200. The carload business, the local division superintendent says, is running about 10 per cent above the "depression" normal.

John H. Goss, vice-president of Scovill, has been renominated vice-president of the Manufacturers Association of Connecticut. Mr. Goss has also been elected president of the Connecticut branch of the National Economy league.

F. J. Gorse, 70 years, assistant treasurer of Scovill, who died Oct. 1, was a third cousin of the Goss brothers who hold the principal offices of the Scovill company. (He retained the old English spelling of the name). He came to the company 52 years ago when the late Chauncey P. Goss was working his way up in the concern. He was of such a retiring disposition that few persons had any inkling of his affairs. He was a member of the First Methodist Church, but did not belong to any other organization, and kept much to himself. It is believed his only relative is his brother, Arthur H. Gorse of 120 Broadway, New York, who has applied for administration papers. He never married. He was buried in New York.

W. R. B.

Connecticut Notes

NOVEMBER 1, 1932.

HARTFORD—Arrow-Hart and Hegeman Electric Company paid regular quarterly dividend of $1.62½ on preferred, and quarterly of 10 cents on common October 1. In previous quarter dividend on common was 15 cents. Business in the hardware and electric device business is not very active, and is among the last to feel improvement. The company is giving employment to about 1,500 29 hours a week. Normally it employs about 3,000 55 hours a week. It does not anticipate any improvement for six months.

Royal Typewriter Company predicts its financial report for September will show earnings instead of losses as in previous months. Production of new line of "Signet" typewriters, a compact, portable design, is now exceeding 700 weekly and will be up to 1,000 shortly. It will announce another portable model shortly. It has not experienced any step-up in production in its standard machine division but has been reducing inventories.

Colt's Patent Fire Arms Company states salesmen are sending increased orders. The molded product division is quite active, but the washing machine business is poor.

Standard Screw Company paid regular quarterly dividend of 50 cents on Oct. 1.

BRIDGEPORT—Remington Arms Company is said to have received a contract for a large supply of ammunition from Colombia, S. A. Heretofore, it is said, this country bought munitions mainly from Europe.

An industrial corporation employing 600 workmen is expected to lease a Bridgeport factory soon, according to John A. Kimber, industrial secretary of the Chamber of Commerce. Several other firms having from 50 to 200 workmen are considering locating here.

NEW HAVEN—Winchester Arms Company has an order for arms and ammunition for a South American republic, and many of the employes laid off a few months ago have been recalled. The order is said to have come from Brazil.

Marlin Firearms Company has acquired the children's vehicle business of the **Rattan Manufacturing Company.**

BRISTOL—Bristol Brass Corporation paid regular quarterly dividend of $1.75 on preferred on Oct. 1.

Sessions Clock Company is improving its line of electric clocks, having developed a new self-starting motor and made improvements in its manually starting motors and in the adaptation of the Session chimes to its electric clocks.

E. Ingraham Company, clock manufacturer, has started production of a line of kitchen furniture and cabinets.

NEW BRITAIN—Stanley Works declared regular quarterly dividend of $1.50 on preferred, payable Nov. 15 to stock of record Nov. 5. Quarterly of 25 cents on common was paid Oct. 1.

TERRYVILLE—Eagle Lock Company, building hardware manufacturer, paid quarterly dividend of 50 cents a share Oct. 1. Previously 62½ cents was paid, and until this year it paid 75 cents.

NORWALK—Standard Razor Com-

Canadian Tariffs—Continued

Commodity	General Rates (Apply to U. S. & Other Non-Treaty Countries). New.	Old.	British Preferential Tariff. New.	Old.
Scissors and shears, n. o. p.....	No change	30%	Free	20%
Razors and razor blades.....	No change	30%	Free	20%
Passenger automobiles valued retail at place of production, when new, with standard equipment complete at more than $1,200 each, but not more than $2,100, chassis for same.....	No change	30%	Free	15%
Passenger automobiles valued at retail at place of production, when new, with standard equipment complete at not more than $1,200, commercial motor cars and trucks (not for railways or tramways) chassis for same....	No change	20%	Free	12½%
Automobiles and motor vehicles of all kinds, n. o. p.; chassis for same	No change	40%	Free	15%
Specified parts and accessories imported by manufacturers of motor omnibuses, including distributers, oil and gasoline gauges, speedometers and parts thereof, body cowls, etc.....	Free	Varying	Free	Varying
Motorcycles or sidecars therefor..	30%	20%	Free	12½%
Trawls, trawling spoons, flyhooks, sinkers, swivels, sportmen's fishing reels, baits and hooks and fishing tackle, n. o. p.....	No change	30%	Free	20%
Guns and rifles of class or kind not made in Canada.....	No change	30%	5%	10%
Electric telephone and telegraph apparatus, and complete parts thereof	30%	27½%	Free	15%
Electric wireless or radio apparatus and complete parts thereof.....	30%	27½%	Free	15%
Electric storage batteries composed of plates, measuring not less than 11 inches by 14 inches and not less than ¾ inch in thickness, complete parts thereof.....	No change	27½%	Free	15%
Steel bicycle rims not enameled or plated	No change	35%	Free	15%
Goldshafts of seamless steel, coated or not, but not chromium plated	No change	35%	10%	15%
Steel balls not larger than ¾ in. in diam. commonly known as burnishing balls	10%	35%	Free	15%
Surgical and dental instruments of any material; surgical needles, X-ray apparatus, microscopes valued at not less than $50 each by retail, and complete parts of all the foregoing.....	10%	Free	No change	Free

pany operations are heaviest since it was established three years ago. **President Charles A. Williams** says orders on hand will compel it to operate day and night for some time to come.

CHESHIRE — Cheshire Ball and Socket Company is doubling operating capacity, going on six days a week, and from time to time working overtime.

ROCKY HILL—Connecticut Foundry Company finds business excellent, and **A. R. Enquist,** secretary, believes uptrend will be permanent. Firm is running full time and employing about 80 per cent of the largest number of employes that were ever given work.

SOUTHINGTON—The State Board of Fisheries and Game is conducting an investigation to ascertain which factory here is polluting the Quinnipiac River with acids. Thousands of fish have died, and the state board expresses the fear that children and cattle might drink some of the water and be poisoned.

W. R. B.

Western Massachusetts

NOVEMBER 1, 1932.

During the past month the 26 metal working plants in Western Massachusetts have shown an employment increase totaling 830, and many manufacturers feel that even greater gains will be made between now and the first of the year. The increase amounts to approximately 10%, and industries included are in automotive lines, electrical goods, special machinery, forgings, machine tools, paper mill and textile machinery, and heating equipment. A slight increase has been reported in the Boston area, and at the present time reports indicate that although there has been no increase in the Worcester district, manufacturers in that area are confident the upturn will come soon. In general, industrialists believe the increase is more than seasonal, and that the increase in orders is not due in any great measure to depletion in working materials.

Local foundries report business is remarkably good. At the **Hastings and Schoen** plant many men have been recalled; and at the present time an overtime schedule is in force, with no indication of when production will drop back to normal. The same thing is true at the **Springfield** foundry.

Business at the **United American Bosch** factory is better than it has been in some time, and officials there look toward the future with optimism. While at present there has been no decided manifestation of any marked upturn at the **Wico Electric Company,** officials believe the crisis has passed and business will continue on the upturn.

At the **Gilbert and Barker** plant, where throughout the summer and early fall there has been a minimum of activity, there is slight improvement, and a few members of the former staff have been ordered to report to work.

Activities at the **Cheney Bigelow Wire** works orders are moderately fair, while at the **Indian Motorcycle** plant there is some activity in the tool making division. It is not indicated, however, that this activity is other than seasonal. At the **Van Norman Machine Tool Company** there is moderate activity, and at **Westinghouse Electric** it is fair, although the plant is not yet ready to go on a full time basis because of the necessity of putting it in condition for marked activity. There is an indication that because of large orders received from the government there will soon be greater activity at the **Standard Electric Time Company** than there has been in many months.

G. B. Y.

Middle Atlantic States

Central New York

NOVEMBER, 1, 1932.

A slight seasonal pickup is reported in the Central New York area by manufacturers of non-ferrous metal goods.

The Utica Industrial Association reports increases of 2.8 per cent in employment and 6.2 per cent in hours worked in the metal trades in Utica. The metal trades employment figure for August was 52.2 per cent of normal, and it went up to 55 per cent in September. The number of hours worked was reported at 64.7 per cent of normal for August and 70.9 per cent for September. Percentages in the number employed are based on the average four years, 1925-1928, while the hours worked are based on normal working schedules.

Divine Brothers Company, Utica, polishing equipment maker, is anticipating a good winter. More orders are coming into the factory although they are still small. **B. D. Divine,** treasurer, says:

"Customer plants are requiring more materials from Divine Brothers, and seem to show more increased activity. The tone of the market seems to be 'buy, don't wait for lower prices.' "

Frank Buck, author of "Bring 'Em Back Alive" recently wrote **Savage Arms Company** that the only gun he carried in making the motion picture of the book in Malaya was a .300 calibre "Savage." It was used once when a tiger charged him, and his hunter killed it.

Reports come from **Oneida Community Ltd.,** Sherill, N. Y., that they are experiencing good business on Christmas orders. New patterns in silverware this season are attracting added business, officials say.

E. K. B.

Newark, New Jersey

NOVEMBER 1, 1932.

John J. Clancy has been appointed receiver for **Industrial Welded Alloys, Inc.,** 8 Lister Avenue, on application by **Alfred E. Maskrey,** a director of the concern, who charges the defendant is insolvent and has suspended operations. Although no exact figure was given regarding assets, they were said to consist of a building mortgaged for $155,000, accounts receivable, materials and machinery. Liabilities were said to approximate $15,000.

A suit in equity charging violation of patent rights has been filed by **Art Metal Works, Inc.,** Newark, against **Charles P. Landau,** New York City. The Newark concern charges infringement of patent rights for an improved cigar lighter invented in 1926 by **Louis A. Aronson,** its president. The defendant is charged with manufacturing and selling what Landau calls the "Evans Roller-bearing Lighter." The plaintiff asks for a return of profits and an injunction to prevent further infringement.

Following Newark concerns have been incorporated: **Schaefer & Beyer, Inc.;** $125,000 capital; manufacture blow torches. **Franz Joseph Drucker Corp.;** $10,000; jewelry and silverware. **Aviation Piston Ring Co., Inc.,** 100 shares. **Luxor Lamp Works;** 50 shares; electrical fixtures.

C. A. L.

Trenton, New Jersey

NOVEMBER 1, 1932.

John A. Roebling's Sons Company will shortly increase activity considerably because of two large orders. The company recently was awarded contract for manufacture and erection of bridge cables and accessories for the proposed Golden Gate bridge in California. The contract amounts to $5,855,000. The total cost of the bridge will be nearly $25,000,000. **William A. Anderson,** vice-president of the Roebling company, said his concern would not be required to begin actual work for some time.

The Roebling company has also received a contract to manufacture 200,000 pounds of galvanized wire strand for use in the improvement of the Mississippi Valley facilities to prevent flood damage. The wire is to be used in mattings which will strengthen the banks and levees of the river.

Titanium Pigment Company, subsidiary of the **National Lead Company,** announces that it will erect a $3,000,000 plant at Sayreville, N. J., if the Federal Government will dredge a twenty-foot channel in the Raritan River at that place. The Titanium concern has been in the market for a site in that section of New Jersey for the past two years.

Following concerns have been chartered here: **William Stinen Manufacturing Company;** metals; 1,000 shares capital; Irvington. **Buermann Laboratories, Inc.:** chemicals; $25,000; Lakewood. **Polycon Chemical Company,** 1,000 shares; Union City. **United Iron and Metal Co., Inc.;** $125,000; metals and waste materials; Atlantic City.

C. A. L.

Middle Western States—Pacific Coast

Detroit, Michigan

NOVEMBER 1, 1932.

Some phases of metal industry have shown a trace of improvement during the last month. In general, however, things have followed the quiet summer trend.

Some manufacturers of plumbers' and steam fitters' supplies report conditions a little better. In the electric refrigeration field manufacturing has been quite steady. In fact, reports from this field have been encouraging throughout the summer.

Nothing particularly encouraging can be said for the plating industry. Conditions are exceedingly quiet. None of the plants are operating to any extent.

Nothing encouraging can be said for the motor car industry. Production is at the lowest point it has been in many years. No one is expecting much in this line at least until after the election.

Titan Electric Company, Hillsdale, Mich., is in production again. This concern recently moved from Adrian. It manufactures small electric motors, bank geared motors, electric grinders and electric pump jacks.

William R. Wilson, chairman of the board of directors of the **Copeland Products Company, Inc.,** electric refrigerator manufacturer, has been made president of the organization.

Charles F. Norton, vice-president and general manager of the **Howell Electric Motors Company,** Howell, Mich., announces development of a new capacitor type motor. It is a fractional horsepower motor with a built-in capacitor. It will eliminate what has been the greatest objection to motors of the capacitor type, it is claimed.

Louis J. Wohnlich, 87 years old, former manufacturer of precision instruments, died at his home in Detroit on September 21. He was born in Basle, Switzerland, and came to Detroit when 16 years old. Until his retirement shortly after the war he furnished instruments for the United States Great Lakes Survey Service.

September brought an improvement in operations to the **Bohn Aluminum and Brass Corporation,** Detroit, which is gradually increasing its working force. A brisk upturn in sales of divisions catering to other than the automotive business has developed in recent weeks, it is stated. This is particularly true of the plumbing supply business.

Mueller Brass Company, Port Huron, Mich., recently was awarded government contracts to supply 500,000 forgings at a cost of $30,000.

McCord Radiator and Manufacturing Company is planning, it is stated, to materially supplement its diversified business as a result of recently entering into the air-conditioning field. It is offering a new type of equipment, a combination air-conditioning, cooling, heating and dehumidifying unit for use in business and professional offices, banks, stores, shops, etc.

Eureka Vacuum Cleaner Company is to re-open its plant about November 1, or thereabouts. Materials are being ordered and dies and tools made to get into production.

Sales of the **Long Manufacturing Company,** producers of radiators, grilles and clutches, for the first half of 1932 were 23 per cent greater than for the same period a year ago. It is expected this rate of gain will continue throughout the remainder of 1932.

Leonard Refrigerator Company, Grand Rapids, is back in production again after a short shut-down for repairs. **R. I. Petrie,** general sales manager, reports the largest volume of sales in its history.

Production of electric stoves by the **AB Stove Company,** Battle Creek, is expected to be materially increased before the end of the year. It expects soon to have 500 men employed.

A marked improvement in business, particularly in the radio industry, has resulted in the employment of more than 250 operatives in the coil department of the **Anaconda Wire and Cable Company,** Muskegon, Mich. Three shifts are now used, with a five-day week, it is stated by **Fritz L. Meeske,** vice-president and general manager.

Approximately 2,300 employes are back at work in the **Chevrolet** foundry after a two-weeks' lay-off for inventory.

Frederick B. Stevens, one of the oldest foundry supply men in the middle west, succeeds to the office of Sovereign Grand Commander of thirty-third degree Masons for the northern district of the United States. He takes the place of Leon M. Abbott, recently deceased.

F. J. H.

Toledo, Ohio

NOVEMBER 1, 1932.

Automobile accessory plants are quiet. Some are engaged moderately, but as a rule few are showing much activity. The plating plants are a little more active, especially those that are engaged on work outside the motor car field.

John N. Willys, president of the **Willys-Overland Company,** is one of the national leaders in the campaign for a universal five-day week. "From a purely economical viewpoint, if from no other," declares Mr. Willys, "such a plan commends itself, particularly at this time of extensive unemployment. With the tremendous over-capacity of machinery, a five-day week schedule applied to everybody would provide the nation with a considerably wider spread of employment, and thus prevent to a great extent a recurrence of conditions such as exist today."

F. J. H.

Chicago, Illinois

NOVEMBER 1, 1932.

William C. Grunow, former president of **Grigsby - Grunow Company,** has formed the **Grunow Corporation,** and plans to begin immediate production on electric refrigerators. Later production will probably include radios and other household items.

Grigsby-Grunow Company rehired 650 men during September, bringing the total number of employees on September 30 to 2,630. Orders placed by radio dealers at distributors' meetings are approximately 50 per cent ahead of last year, it is stated.

Birtman Electric Company, manufacturers of electric washers, vacuum cleaners, etc., notices a more than seasonal increase the past two months. Sales in September gained 160 per cent and necessitated doubling the working force.

Westinghouse Electric Elevator Company, commenting on recent inquiries for small elevators, recalls that these same signs of renewed activity in 1922 were more or less a forerunner of the return of prosperity.

Westinghouse, according to **N. G. Symonds,** commercial vice-president in Chicago, booked orders during September for refrigerators to a dollar total 59 per cent greater than August and 17 per cent ahead of September, 1931.

McGraw Electric Company is introducing a new electric toaster on which its subsidiary, **Waters-Genter Company,** started production in late August. Sales the third quarter exceeded total for first half of 1932.

Recent orders by **Dole Valve Company** have necessitated a payroll increase of more than 100 per cent.

Edward Katsinger Company, tinware manufacturer, reports that since June the number on the payroll has increased 61 per cent, and the payroll itself 85 per cent.

Wahl Company, fountain pen and pencil manufacturer, has added approximately 100 men to its payroll.

Vesta Consolidated Corporation, manufacturer of storage batteries, is now operating six days a week, with a higher output than in the past 15 months.

Illinois Bell Telephone Company reports first increase in Chicago installations in three years.

Allis-Chalmers Manufacturing Company has taken over the South American branch houses and inventory of **B. F. Avery and Sons, Inc.**

New companies: Reuter Brothers Iron Works, Inc., 5820 South Wood Street; capital $60,000; iron and bronze work.

Williams Products, Inc., 38 South Dearborn; capital $50,000; manufacture electrical devices.

Chicago Coin Machine Exchange, 2200 North Western Avenue; capital $10,000; manufacture coin operated machines.

R. G. K.

Wisconsin Notes

NOVEMBER 1, 1932.

Interesting developments are being made in welding of bronze to cast iron and steel, according to **C. J. Zaiser,** president of **Ampco Metal, Inc.,** Milwaukee. Failure of valve seats to hold up is overcome by this new process, using a special bronze which will not pit, corrode or carbonize, Mr. Zaiser states. The trouble has been to find a bronze with the same coefficient of expansion as cast iron or steel for welding purposes. A special bronze has been developed, it is claimed, which amalgamates when welded and becomes an integral part of the iron itself. An application of this principle is in Ampco dies, which are now being used to weld sections of steel auto bodies together to form a "one-piece" body. The Milwaukee firm is supplying Studebaker with welding jaws made of the alloy for use in turning out all-steel auto bodies.

Metal firms in all sections of the state participated in Wisconsin Products Week the week of Sept. 25, and displayed their products in store windows in the various cities in Wisconsin. In Milwaukee the old firm of **Loeffelholz Company** had on display bronze book ends and ash receivers, brass ladies with flowing tresses, metal monks with metal glasses of beer, railroad fittings which the firm has been making ever since its founder started a small shop in the city in the last century.

In La Crosse the **O. J. Lunde** brass foundry displayed several types of emblems, boat propellers and brass tubing. In Manitowoc the **Aluminum Goods Manufacturing Company** featured displays in all hardware and department stores, while the **Aluminum Specialty Company,** and the **Wisconsin Aluminum Foundry** also displayed its products in that city.

National Pressure Cooker Company showed its line of aluminum goods in Eau Claire; **Burlington Brass Works** featured displays in Burlington windows. **Leyse Aluminum Company,** manufacturers of "Priscilla" aluminum cooking utensils, displayed products in Kewaunee, where the industry is located.

C. A. W. Vollrath, 73, president of the **Vollrath Company,** Sheboygan enameling concern, died Oct. 7 at his home in that city. Mr. Vollrath had been actively engaged in the business from the age of 15. He began in the employ of his father, Jacob J. Vollrath, founder of the company. He had retired from active duty two years ago because of illness. He is survived by his wife, a daughter and two sons.

An improved tone in business is reported by **Alfred Kieckhefer,** president of the **National Enameling and Stamping Company,** Milwaukee. Especially in the southeastern part of the United States, news is more encouraging. The Milwaukee firm's Baltimore plant is running full in some departments, it was stated.

W. T. N. B.

Los Angeles, Calif.

NOVEMBER 1, 1932.

Phelps-Dodge Copper Products Company has moved its plant to 2375 East 27th Street, Los Angeles. Company makes electrical wire products, transformers, coils, etc. **R. A. Connor** is manager.

Solar Lighting Fixture Company, 44 North Western Avenue, has a $107,500 contract for fixtures for General Hospital, Los Angeles.

Warren McArthur Furniture Company, Los Angeles, has started production of unwelded aluminum furniture on a good scale, with considerable shipments to the east, including 100 sets to Marshall, Field Company, Chicago.

Broadway Sight Company has undergone expansion and has moved to 1139 North Alameda Street. They make outdoor advertising signs.

Willard Storage Battery Company, 5700 East 9th Street, is building a $100,000 plant addition for lead oxide and sulphuric acid production. **C. H. Starr** is general manager.

Claude Neon Electrical Products, Inc., Los Angeles, has developed a lighting tube said to be 16 times as brilliant as the neon tubes now in use.

Keystone Machine Company, 1448 San Pedro Street, has installed new equipment for expansion of their lines.

Art Tile Products Company, 128 South Avenue 64, are making art placques of brass and bronze.

Hamilton Manufacturing Company, 4440 East 49th Street, a branch of the Two Rivers, Wis., company of same name, is taking over hospital equipment line of **Albatross Steel Furniture Company** here, and is enlarging the Hamilton plant. **R. G. E. Cornish** is in charge of the new line. Hamilton company is a large maker of steel hospital furniture.

Edward H. Bohlin, 6309 Sunset Boulevard, has enlarged his facilities and is making a line of silver cups and other hollow ware.

Industrial X-Ray Laboratories, 7532 Subway Terminal Building, has started a service of X-ray testing of metal products, for detection of flaws in material, welds, castings, etc.

Fountain Advertising Service, 618 Rowan Building, is making automatic water fountains.

Safety Incinerator Company has leased 60,000 sq. ft. at 4326 East 14th Street, Oakland, Calif., and will make outdoor incinerators.

Thompson Valve Company, 1801 West Madison Street, Phoenix, Ariz., has been organized. Capital: $1,000,000; product: valves; management: J. C. Thompson, E. G. Smith, Walter Smith.

Isaacson Iron Works, Seattle, Wash., has substituted aluminum castings for steel in manufacture of many parts for 6-wheel tank trailers, effecting a reduction of 3,300 pounds in their weight.

Standard Oil Company of California, 225 Bush Street, San Francisco, is using considerable copper tubing in connection with its bottled gas business. Containers of it are sold for land and marine fuel use.

Payne Furnace and Supply Company, 336 North Foothill Road, Beverley Hills, has enlarged plant and will make household heaters for national distribution. **L. E. Payne** is general manager.

H. S.

Other Countries

Birmingham, England

OCTOBER 21, 1932.

The Ministry of Labor records a drop in the number of unemployed in the Midland district. The non-ferrous metal trade has absorbed some part of the increase, although only a small part. One firm of brassfounders in Birmingham reports that it has reinstated a number of workers in the factory during the last few weeks. This, they say, is partly due to an increase of orders from users who were buying from the Continent before tariffs were imposed. Some business is held up by financial stringency among municipalities and other bodies who are economizing on all but necessities. Earlier in the month, when copper touched £36 a ton, customers showed anxiety to renew contracts under the impression that the increase was a genuine firming up of the market, but copper has declined, with resultant slackening in business.

The opening meeting of the Birmingham Metallurgical Society was held October 6, when the new president, **A. A. Jude,** gave an address. He remarked that in metallurgy an enormous complexity is being fostered. Alloys are simply being spawned, and nine out of ten are as like as two peas from point of utility. But throughout it all there seems to be a partly unconscious struggle to produce an ideal metal. Heat treatment, which figures so largely in modern metallurgy, he believes to be a movement in the wrong direction. What are wanted are metals in the most stable form, and that form was not to be found in what he called the "highly strung."

The Institute of Metals has just issued from London a comprehensive program of meetings to be held during 1933.

A campaign to increase the sales of domestic aluminum hollow ware takes the form of an Aluminum Week from October 24 to 29. It is backed by the **British Aluminium Hollowware Manufacturers Association,** in a unique effort to increase profitable business to the benefit of the British public, British hardwaremen and British manufacturers. It is

a co-operative effort on the part of more than twenty manufacturers who make no attempt to control prices nor restrict competition; on the contrary, every one is making a special effort to offer exceptional service. In urging the use of aluminum for cooking utensils the manufacturers quote the British Medical Journal as to the suitability of aluminum for culinary use. F. J. H.

Business Items —Verified

John J. Jackson Company, Astor Street, Newark, N. J., refiner of precious metals, has liquidated its business, according to **H. W. Boynton,** president.

Tyler Sales-Fixture Company, formerly at Muskegon Heights, Mich., has acquired new property and removed to Niles, Mich. Plant capacity for store fixture production has been increased. **H. C. Davis** is in charge.

C. R. Breuer Smelting and Refining Company, Cincinnati, Ohio, has removed to 1918 West 8th Street from former location on Alabama Avenue. Company is smelter and refiner, and plans establishment of a nonferrous foundry shortly. **Robert Breuer** is an official.

Jenkins Brothers, Inc., Elizabeth, N. J., maker of valves and mechanical rubber specialties, is removing the rubber goods division to Bridgeport, Conn. About 100 Elizabeth employes are affected; preference will be given those wishing to transfer, according to the management.

Presto Lock Corporation, 192½ Greene Street, New York, has leased 20,000 sq. ft. in the Gair Building, Brooklyn, N. Y., for a new plant. Company manufactures locks and allied devices, and is in market for used gang roller and a slitter. It does plating, polishing, lacquering, etc.

American Cyanamid and Chemical Corporation, New York, and subsidiaries held their fall golf outing and field day October 12 at Briarcliff Lodge, New York. Attendance was increased by presence of many district sales managers who were in New York for the company's sales meeting.

Sinnock-Bachofner, Inc., 229 Murray Street, Newark, N. J., precious metal refiners, has entered several new lines, due to slackness in its main business. Having extensive plating facilities, it is applying silver to glass and china, plating lighting reflectors for street signals, signs, etc., and its research department is developing new reflector ideas.

American Smelting and Refining Company, New York, has acquired business and assets of **Federated Metals Corporation,** New York, leading interest in secondary metals industry, operating plants in various parts of the country. The contract is to be placed before Federated directors and stockholders for approval, which it is expected they will grant without delay.

Hanson-Van Winkle-Munning Company, Matawan, N. J., large electroplating equipment and supply producer, has installed a teletypewriter service for receipt of orders at Chicago and Detroit sales offices, Anderson, Ind., plant, and general office and factory at Matawan. Teletypewriter numbers are: Anderson, Ind., AND 2; Chicago, Ill., CGO 268; Detroit, Mich., DET 378; Matawan, N. J., MATAWAN—N J ii.

Canada Wire and Cable Company, Ltd., Leaside, Toronto, Canada, has purchased rights to manufacture patented "Streamline" plumbing fittings for connections in copper pipe, controlled by **Mueller Brass Company,** Port Huron, Mich. Canada company is large maker of plumbing, electrical, refrigeration and industrial metal products. Production on the new products will start within a month, according to **President H. Horsfall.** Little new machinery but considerable pattern and some molding equipment will be added. Departments operated: nonferrous foundry; tool room; machine shop; casting, plating, polishing and lacquering.

Metal Market Review

By R. J. HOUSTON

D. Houston and Company, Metal Brokers, New York

Copper

Despite restricted demand and quiet conditions the market for copper remained steady at 6¼ cents per pound for electrolytic delivered to Connecticut Valley points. There were reports of fractional concessions for some outside lots from time to time, but first hands refused to go below the 6¼ cent level.

A distinct improvement in the copper and brass industry was reported by leading manufacturers. Sales of fabricated products covered a wide field and appeared to be based on a general improvement in business. Evidence of this upturn in business has resulted in the employment of more operatives in several important departments of manufacture.

Zinc

Heavier shipments of zinc and a reduction of smelters' stocks were features causing more than a ripple of interest in trade circles. Curtailed output and larger shipments resulted in reducing stocks of slab zinc to 123,056 tons at end of September as compared with 131,203 tons at the end of August.

Recent buying demand was relatively quiet. Prices were fractionally lower than a few weeks ago with present quotations of 3.05c East St. Louis and 3.42c New York.

Tin

Trading in tin was moderately active lately. There was nothing spectacular in the market movements either here or abroad. The opening was on the basis of 24½ cents for prompt Straits tin. It soon sold off several points, but quickly regained the loss. In the first fortnight, however, the price dropped to 13.85c on weakness in Wall Street and quiet demand. Active trading and advancing prices in the London market was reflected here and caused a prompt advance to 24.10c and later to 24.40c.

Buying interest at close was quiet and price of Straits tin for prompt shipment and balance of the year eased off to 24.10c.

Lead

Trading in lead was in good volume during early October. Early in the month the trend of the market was upward and the New York basis advanced to 3.25c to 3.30c to the accompaniment of fairly active buying. These quotations, however, did not last long. There was a reduction to 3.15c and on October 10 to 3.00c at which a substantial amount of business was booked. In some cases 3.05c New York was quoted, but demand was limited for the October and November positions. The St. Louis basis was 2.90c to 2.95c.

Aluminum

This market holds its ground steadily and circumstances have not made it necessary to lower prices by a single fraction for new aluminum. There is a moderate outlet for supplies, but these are so controlled that no pressure is apparent to affect market prices. Consumption is much below normal, but improvement is expected when automobile manufacture increases as new models are brought out. The differential for remelted aluminum is considerable, but prices for these grades are also steady and the same is true for secondary material.

Antimony

All through recent weeks the price changes for antimony were negligible with the general tendency steady on the basis of 5.62½c duty paid for Chinese regulus. Consuming inquiry for round lots has been lacking for some time past, but no special pressure to sell comes from China.

Quicksilver

A steady undertone is reported in quicksilver at $48 per flask. Recent changes were of minor importance with demand rather quiet.

Platinum

There have been no recent developments to affect prices of platinum. Buying is

restricted and refined platinum is quoted at $30 per ounce.

Silver

Silver fluctuations were of slight importance and trading for past several weeks was within a very narrow range. At current quotations of 27⅜c the present price is only a little above the low of the year. Chinese buying of bullion was reported in this market recently, but prices refuse to move strongly upward. Conditions have not been favorable for silver and attempts to reach some plan of international action to stabilize the white metal appear to be fruitless thus far. Values are measured in terms of gold, but gold in comparison with other things has become scarcer—therefore dearer. At present gold is more than seventy times as expensive as silver. It takes more copper, more tin, more lead, more of everything else to buy an ounce of gold because there is not enough gold supply to keep pace with the demands of civilization.

Old Metals

There has been no significant development in the market for scrap material that would indicate signs of an upswing in prices. Dealers with domestic and European connections report dull conditions and easier movements particularly in the copper and lead grades. Transactions for export are specially difficult owing to inability of consumers to buy freely in this market. Reductions in virgin lead and low outside offers of electrolytic copper had an unsettling influence on secondary material. A moderate movement of brass and copper grades was noted, but lead and zinc were sluggish owing to caution of consumers.

The Wrought Metal Business

By J. J. WHITEHEAD

President, Whitehead Metal Products Company of New York, Inc.

NOVEMBER 1, 1932.

Increased business that was considered a month ago as a seasonal pick up by copper and brass mills has further increased, and it seems almost certain that the low point in the production curve has been passed. There will undoubtedly be setbacks and then further surges ahead. However, all indications point toward a slow but gradual improvement.

Domestic consumption and production of copper are now balanced, and as a matter of fact probably consumption at present as compared to the average for the last three months is at a higher rate. Stocks of refined copper which amount to about 650,000 tons are controlled by about seven large corporations, and there is no evidence that any dumping tactics are to be pursued. It would seem therefore that the price trend will remain strong.

Prices of aluminum, nickel and Monel are steady, and stocks are well in hand and do not constitute a threat to the price structure. Demand and inquiries for these materials are holding up, considering the slackness in all lines of industry.

The Monel metal sink has just won first prize for artistic design. The price of it has been reduced so that now it may be purchased by any one who wants a beautiful, lasting and modern sink.

The copper industry is doing considerable research, and while the work has been under way but a short while results are already noticeable. Probably in the future the use of metals of all kinds is going to be much larger than heretofore. One of the problems of copper and its alloys is the development of surfaces that will not only retain the beautiful natural color of copper but also to develop a means of producing on copper and its alloys a variety of colors. Great progress has been made in this direction, and when the time is right users of these materials will have available permanent and beautiful color effects.

The research work of the aluminum interests is also developing many new uses for their products, and The International Nickel Company has not curtailed the research and development program for nickel and its alloys.

When industry is again going forward with sure and steady strides the metal industries will be prepared to take advantage of many new and attractive developments that will help to stimulate the more extensive use of metals.

The electrical industry seems to be picking up. Note the statement by Westinghouse:

"From a careful analysis of the general business situation, the management has no hesitancy in stating that the turn for the better has been made."

Daily Metal Prices for the Month of Oct., 1932

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	3	4	5	6	7	10	11	*12	13	14	17	18
Copper c/lb. Duty Free												
Lake (Del.)	6.375	6.375	6.375	6.375	6.375	6.375	6.375	.....	6.375	6.375	6.375	6.375
Electrolytic (Conn.)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	.....	6.00	6.00	6.00	5.75
Casting (f.o.b. ref.)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	.....	6.00	6.00	6.00	6.00
Zinc (f.o.b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	3.10	3.10	3.10	3.10	3.10	3.05	3.05	.....	3.05	3.05	3.05	3.05
Brass Special	3.15	3.15	3.15	3.15	3.15	3.10	3.10	.....	3.10	3.10	3.10	3.10
Tin (f.o.b. N. Y.) c/lb. Duty Free												
Straits	24.20	24.50	24.30	24.10	24.00	23.85	24.10	.....	24.25	24.25	24.40	24.25
Pig 99%	23.125	23.375	23.25	23.00	22.90	22.75	23.00	.....	23.10	23.10	23.15	23.00
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	3.00	3.15	3.15	3.10	3.10	2.90	2.90	.....	2.90	2.90	2.90	2.95
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	.....	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	.....	35	35	35	35
Shot (from remelted electrolytic)	35	36	36	36	36	36	36	.....	36	36	36	36
Pellets 99.5-100%	40	40	40	40	40	40	40	.....	40	40	40	40
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	5.625	5.625	5.625	5.625	5.625	5.625	5.625	.....	5.625	5.625	5.625	5.625
Silver c/oz. Troy Duty Free	27.375	27.375	27.375	27.25	27.375	27.50	27.375	.....	27.50	27.50	27.375	27.375
Platinum $/oz. Troy Duty Free	30.00	30.00	30.00	30.00	30.00	30.00	30.00	.....	30.00	30.00	30.00	30.00

	19	20	21	24	25	26	27	28	31	High	Low	Aver.
Copper c/lb. Duty Free												
Lake (Del.)	6.125	6.125	6.125	5.875	5.625	5.50	5.25	5.25	5.375	6.375	5.25	6.069
Electrolytic (Conn.)	5.75	5.75	5.75	5.50	5.25	5.25	5.125	5.125	5.25	6.00	5.125	5.725
Casting (f.o.b. ref.)	5.75	5.75	5.75	5.50	5.25	5.125	5.125	5.00	5.00	6.00	5.00	5.713
Zinc (f.o.b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	3.05	3.05	3.05	3.05	3.05	3.05	3.00	3.00	3.00	3.10	3.00	3.055
Brass Special	3.10	3.10	3.10	3.10	3.10	3.10	3.05	3.05	3.05	3.15	3.05	3.105
Tin (f.o.b. N. Y.) c/lb. Duty Free												
Straits	24.10	23.95	23.90	23.50	23.45	23.30	23.25	23.35	23.35	24.50	23.25	23.918
Pig 99%	22.85	22.80	22.75	22.35	22.30	22.20	22.15	22.25	22.25	23.375	22.15	22.783
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	2.95	2.925	2.90	2.90	2.90	2.90	2.90	2.90	2.90	3.15	2.90	2.956
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	35	35	35	35	35
Shot (from remelted electrolytic)	36	36	36	36	36	36	36	36	36	36	36	36
Pellets 99.5-100%	40	40	40	40	40	40	40	40	40	40	40	40
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	5.625	5.625	5.625	5.625	5.625	5.625	5.625	5.625	5.625	5.625	5.625	5.625
Silver c/oz. Troy Duty Free	27.375	27.375	27.00	27.125	26.75	26.625	26.625	26.75	26.875	27.50	26.625	27.194
Platinum $/oz. Troy Duty Free	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00

*Holiday.

Metal Prices, November 1, 1932

(Duties mentioned refer to U. S. tariffs on imports, as given in the Tariff Act of 1930.)

NEW METALS

Copper: Lake, 5.375. Electrolytic, 5.25. Casting, 5.00.
Zinc: Prime Western, 3.00. Brass Special, 3.05.
Tin: Straits, 23.40. Pig, 99%, 22.30.
Lead: 2.90. Aluminum, 23.30. Antimony, 5.625.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: Flash, 75 lbs., $48. **Bismuth,** 85.
Cadmium, 55. **Cobalt,** 97%, $2.50. **Silver,** oz., Troy (N. Y.) official price November 1, 27.125.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $30-$32.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	Duty
Brass Ingots, Yellow	4¾ to 6	45%
Brass Ingots, Red	6¼ to 7½	45%
Bronze Ingots	6¾ to 10	45%
Aluminum Casting Alloys	7 to 22	4c. lb.
Manganese Bronze Castings	18 to 35	45%
Manganese Bronze Ingots	6½ to 10	45%
Manganese Bronze Forgings	27 to 35	45%
Manganese Copper, 30%	18 to 25	25%
Monel Metal Shot or Blocks	28	25%
Phosphor Bronze Ingots	7½ to 10	45%
Phosphor Copper, guaranteed 15%	10 to 16	3c. lb.
Phosphor Copper, guaranteed 10%	9¼ to 14½	3c. lb.
Phosphor Tin, no guarantee	30½ to 45	Free
Silicon Copper, 10%	18 to 30	45%
Iridium Platinum, 5%	$33.00	Free
Iridium Platinum, 10%	$34.00	Free

OLD METALS

Dealers' buying prices, wholesale quantities	Cents lb.	Duty
Heavy copper and wire, mixed	3⅝ to 3⅞	Free
Light copper	3 to 3⅛	Free
Heavy yellow brass	1⅞ to 2	Free
Light brass	1⅜ to 1½	Free
No. 1 composition	2¾ to 3	Free
Composition turnings	2⅝ to 2⅞	Free
Heavy soft lead	2⅛ to 2¼	2½c. lb.
Old zinc	1¼ to 1⅜	1½c. lb.
New zinc clips	1⅝ to 1⅞	1½c. lb.
Aluminum clips (new, soft)	10 to 11	4c. lb.
Scrap aluminum, cast, mixed	3½ to 4	4c. lb.
Scrap aluminum, sheet (old)	7¼ to 8¼	4c. lb.
No. 1 pewter	13 to 14	Free
Electrotype or stereotype	1⅞ to 2	2½c. lb.*
Nickel anodes	22 to 24	10%
Nickel clips and turnings	22 to 25	10%
Monel scrap	6½ to 9	3c. lb.

* On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective September 8, 1932.

COPPER MATERIAL

	Net base per lb.	Duty
Sheet, hot rolled	15⅜c.	2⅛c. lb.
Bare wire, soft	8c.	25%
Seamless tubing	14⅜c.	7c. lb.
Soldering coppers	15⅞c.	45%

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	21⅛c.	10% Quality	24c.
15% Quality	23¼c.	15% Quality	28⅜c.
18% Quality	24½c.	18% Quality	31⅝c.

BRASS MATERIAL—MILL SHIPMENTS

Net base prices per pound

Net per lb.	High Brass	Low Brass	Bronze	Duty
Sheet	12½c.	13⅝c.	14c.	4c. lb.
Wire	12½c.	13⅝c.	14c.	25%
Rod	10¼c.	13⅝c.	14c.	4c. lb.
Open seam tubing	20½c.		22c.	25%
Angles, channels	20½c.		22c.	12c. lb.
Seamless tubing	15¼c.		15¾c.	8c. lb.

TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound.	(Duty 4c. lb.)
Tobin Bronze Rod	14c.
Muntz or Yellow Metal Sheathing (14"x18")	14⅝c.
Muntz or Yellow Rectangular sheet other sheathing	14⅝c.
Muntz or Yellow Metal Rod	11¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.30
Aluminum coils, 24 ga., base price	30.00

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (November 1) 30.50c. per Troy oz. upward according to quantity. (Duty free.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.00	2c. lb.
Zinc sheet, full casks (jobbers' price)	9.25	2c. lb.
Zinc sheet, open casks (jobbers' price)	10.00 to 10.25	2c. lb.
Full Lead Sheet (base price)	6.50	2½c. lb.
Cut Lead Sheet (base price)	6.75	2½c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs or over ..... 15c. above N. Y. pig tin price
100 to 500 lbs. ..... 17c. above N. Y. pig tin price
Up to 100 lbs. ..... 25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

Supply Prices, November 1, 1932

ANODES

Copper: Cast ..... 16¼c. per lb.
Rolled, sheets, trimmed ..... 14¼c. per lb.
Rolled, oval ..... 13½c. per lb.
Brass: Cast ..... 14½c. per lb.
Zinc: Cast ..... 08¾c. per lb.

Nickel: 90-92% ..... 41c. to 45c. per lb.
95-97% ..... 42c. to 46c. per lb.
99% cast, 44c. to 48c.; rolled, depolarized, 45c. to 49c.
Silver: Rolled silver anodes .999 fine were quoted November 1 from 30.50c., per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.85/lb.	$2.55/lb.	$2.35/lb.
10-12-14 & 16	2 to 3½	2.75	2.45	2.25
6-8 & over 16	1 to 2	2.95	2.65	2.45
6-8 & over 16	2 to 3½	2.90	2.60	2.35
6 to 24	Under ½	4.15	3.85	3.65
6 to 24	½ to 1	3.85	3.55	3.35
6 to 24	Over 3½	3.25	2.95	2.75

Any Quantity

4 to 6	Under ½, $4.90	½-1, $4.75	1 to 3, $4.65
1½ to 4	" 5.45	" 5.30	" 5.25
1 to ½	" 5.75	" 5.60	" 5.50

Extras: 25c. per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less:

11" 20 ply 64/68 Unbleached	$16.60
14" 20 ply 64/68 Unbleached	27.40
11" 20 ply 80/92 Unbleached	18.70
14" 20 ply 80/92 Unbleached	31.10
11" 20 ply 84/92 Unbleached	24.05
14" 20 ply 84/92 Unbleached	39.90

Sewed Pieced Buffs, per lb., bleached ..... 41c. to 70c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	**.09¾-.14**
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums	lb.	.12 -.17½
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	**.02**
Hydrochloric, C. P., 20 deg., carboys	lb.	**.06**
Hydrofluoric, 30%, bbls	lb.	.08-.12
Nitric, 36 deg., carboys	lb.	**.06-.06½**
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	**.02**
Alcohol—Butyl	lb.	11.30-18.00
Denatured drums	gal.	.475-.476
Alum—Lump, barrels	lb.	**.03¼-.04**
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, 26 deg., drums, carboys	lb.	.02¾-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide	lb.	.28-.37
Arsenic, white, kegs	lb.	.04½-.05
Asphaltum	lb.	**.35**
Benzol, pure	gal.	.58
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk)	lb.	**.05¾-.07½**
Carbon Bisulphide, drums	lb.	.05½-.12
Chrome Green, bbls	lb.	.19
Chromic Sulphate	lb.	.30-.40
Copper—Acetate (Verdigris)	lb.	.20
Carbonate, bbls.	lb.	.14-.20
Cyanide (100 lb. kgs.)	lb.	.39
Sulphate, bbls.	lb.	2.75-5.25
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	**.20¼-.20½**
Crocus	lb.	.15
Dextrin	lb.	**.05-.08**
Emery Flour	lb.	.06
Flint, powdered	ton	**$30.00**
Fluorspar, bags	lb.	.04½
Gold Chloride	oz.	**$12.00**
Gum—Sandarac	lb.	**.26**
Shellac	lb.	.32-.34
Iron Sulphate (Copperas), bbls	lb.	**.01½**
Lacquer Solvents	gal.	.85
Lead—Acetate (Sugar of Lead)	lb.	.09-.13
Yellow Oxide (Litharge)	lb.	**.12¼**
Mercury Bichloride (Corrosive Sublimate)	lb.	**$1.58**
Methanol, 100% synth., drums	gal.	**.41½**
Nickel—Carbonate, dry bbls.	lb.	.32
Chloride, bbls.	lb.	.16-.21
Salts, single, 300 lb. bbls.	lb.	11¾-.13
Salts, double, 425 lb. bbls.	lb.	12¾-.13
Paraffin	lb.	**.05-.06**
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	**.06¾-.08½**
Potassium—Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.06⅝
Cyanide, 165 lbs. cases, 94-96%	lb.	**.50**
Pumice, ground, bbls.	lb.	**.02½**
Quartz, powdered	ton	**$30.00**
Rosin, bbls.	lb.	**.04½**
Rouge—Nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	**.65**
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.05½
Silver—Chloride, dry, 100 oz. lots	oz.	.24½-.27¼
Cyanide (fluctuating)	oz.	.31¾-.37½
Nitrate, 100 ounce lots	oz.	.20¼-.23¾
Soda Ash, 58%, bbls.	lb.	**.023**
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Hyposulphite, kegs, bbls.	lb.	**.03½-.06½**
Metasilicate	lb.	.05 -.06¼
Nitrate, tech., bbls.	lb.	**.03¼-.07**
Phosphate, tech., bbls.	lb.	**.03¾**
Silicate (Water Glass), bbls.	lb.	**.01½**
Stannate, fluctuating	lb.	.22
Sulphocyanide	lb.	.30 -.45
Sulphur (Brimstone), bbls.	lb.	**.02**
Tin Chloride, fluctuating, 100 lb. kegs	lb.	.24½-.25
Tripoli, powdered	lb.	**.03**
Wax—Bees, white, ref. bleached	lb.	**.60**
Yellow, No. 1	lb.	**.45**
Whiting, Bolted	lb.	**.02½-.06**
Zinc—Carbonate, bbls.	lb.	.11
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	**.38**
Sulphate, bbls.	lb.	.03½